Service Manual

Direct Drive Turntable with Quartz Phase Locked Control

SL-1000MK2

(X, XGE, E, XGF)

Original

For additional information, please refer to the service manual Model No. SP-10 MK2 and SH-10B3 + 1643

Notes: * This manual should be filed with the service manual for model SP-10 MK2 (X) (ORDER NO. SD7604-1071) or SP-10MK2 (XGE, E) (ORDER NO. SD7609-1151) and SH-10B3 (X) (ORDER NO. 7609-1150)

* When servicing model SL-1000MK2 (X, XGE, E, XGF), this service manual and the model SP-10MK2 (X) (ORDER NO. SD7604-1071) or SP-10MK2 (XGE, E) (ORDER NO. SD7609-1151) and SH-10B3 (X) (ORDER NO. 7609-1150) service manual should be used together.

Notes:

* The model SL-1000MK2 (X) is available in European, Asia, Latin America, Oceania, Middle East and Africa.
* The model SL-1000MK2 (XGE) is available in England only.
* The model SL-1000MK2 (E) is available in Scandinavia only.
* SL-1000MK2 (XGF) is available in France only.

SPECIFICATIONS Specifications are subject to change without notice for further improvement.

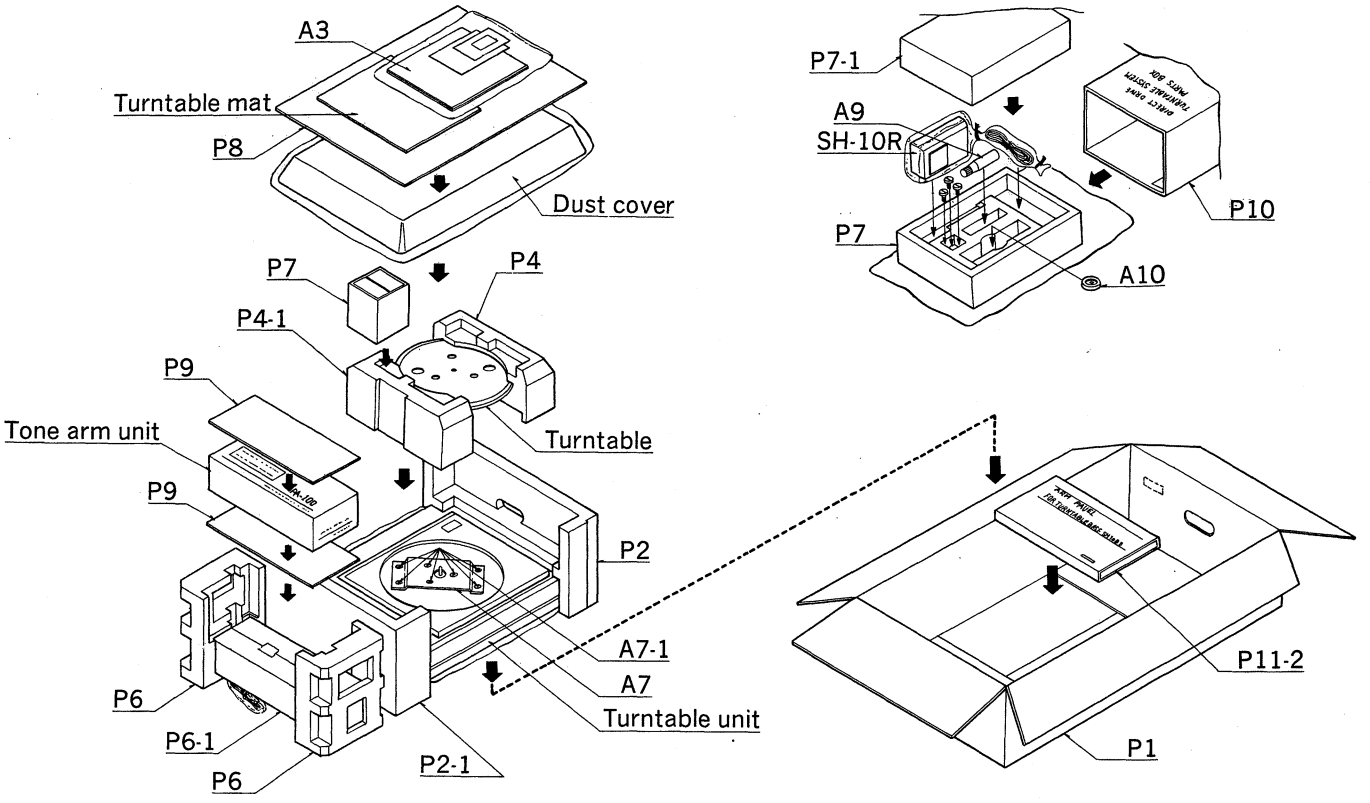
Dimensions ..... 56 x 46.5 x 17 cm (W x D x H)
(22-1/16 x 18-5/16 x 6-11/16" inches)

Weight ..... 26.2 kg (57. 8 lbs)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

■ PACKING PARTS



■ REPLACEMENT PARTS LIST

Notes: [X] is available in European, Asia, Latin America, Oceania, Middle East and Africa.
[XGE] is available in England only.
[E] is available in Scandinavia only.
[XGF] is available in France only.

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
CABINET and CHASSIS PARTS					
1	SFNN101X01	Name Plate	1		*○
ACCESSORY PARTS					
A1	SFAZ103-01	Base, Arm Panel	1		
A1-1	SFAZ103-02	Arm Panel	1		
A1-2	XMC27+16FV	Screw	4		
A2	SFAZ103-01	Base, Arm Panel	1		
A2-1	SFAZ103-03	Arm Panel	1		
A2-2	XMC27+16FV	Screw	4		
A3 [X,E XGF]	SFNU101X01	Instruction Book	1		○
A3 [XGE]	SFNU101G01	Instruction Book	1		○
A7	SFUP102M14E	Mounting Plate, Motor	1		
A7-1	XYN3+C6BS	Screw	7		
A8	SFXZ103-01	Allen Wrench	1		
A9	SFW0010	Oil	1		
A10	SFWE010	45 r.p.m Adaptor	1		
PACKING MATERIALS					
P1 [X, XGE, E]	SFHP101X01	Carton, Inside	1		○
P1 [XGF]	SFHP101J01	Carton, Inside	1		○

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
P1-1 [X]	SFHP101X02	Carton, Outside	1		○
P2	SFHH101-08	Pad, Left	1		○
P2-1	SFHH103-02	Pad, Right	1		
P4	SFHH101-01	Pad, Turntable (Left)	1		○
P4-1	SFHH101-02	Pad, Turntable, (Right)	1		○
P6	SFHH101-03	Pad, Power Unit	2		○
P6-1	SFHD102-06	Case, Power Unit	1		
P7	SFHH101-04	Parts Box	1		○
P7-1	SFHH101-05	Top. Parts Box	1		○
P8	SFHD103-01	Pad, Top	1		
P9	SFHD101-01	Pad, Tone Arm	2		○
P10	SFHD101-02	Case, Parts Box	1		○
P11	SFHH103-03	Pad, Arm Panel	1		
P11-1	SFHD103-02	Spacer, Arm Panel	1		
P11-2	SFHD103-03	Case, Arm Panel	1		
P12	SFDK100G	DIN-PIN Plug	1		
P12-1 [X,XGF]	SFDKI19118	2PIN. Plug	1		
P12-2 [X XGF]	RJP17AS	Adaptor Plug	1		

ORDER NO. SD7609-1150

Service Manual

TURNTABLE BASE/DUST COVER

SH-10B3- (X)

■SPECIFICATIONS

External dimensions. . . . . .56 x 46.5 x 17 cm (W x D x H)
Weight. . . . . .12 kg (including dust cover)
(26.5 lbs.)

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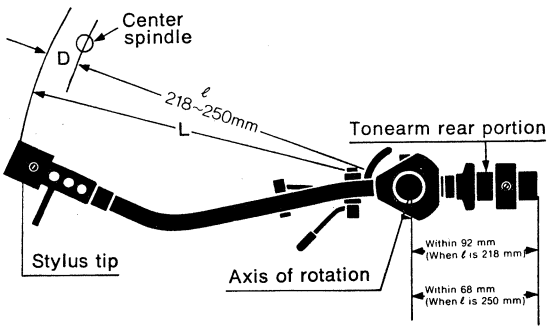
■ PARTS INDENTIFICATION

■ TONEARMS ATTACHABLE TO THE UNIT

Since tonearms attachable to this unit are limited in their dimensions and configurations, select a suitable tonearm based on the following dimensions.

Note:

1) A tonearm having its rear portion longer than that shown in the figure can not be used due to contact with the dust cover.
2) A tonearm whose arm rest is formed to be a separate component can not be employed, either.
   (This is because of the diffculty in drilling a hole for the arm rest in the turntable base.)



L...Arm effective length
Length between the stylus tip and axis of rotation
D...Overhang
ℓ...Tonearm setting length
Length between the center spindle and axis of rotation

When the length (ℓ) = L − D is between 218 and 250 mm, the tonearm can be used.

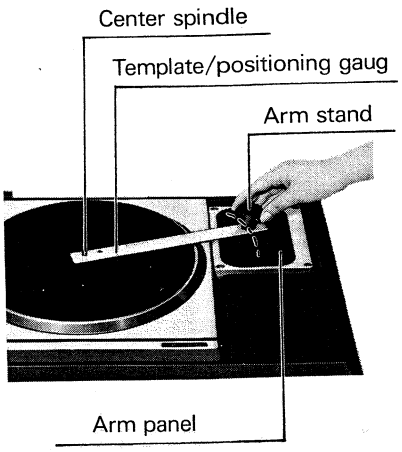
■ INSTALLATION OF THE TONEARM

The procedures described below relate to one example for installing a tonearm.
When actually attaching, mount correctly according to the instructions for the tonearm you are now using.

1. **Align the screw hole of the arm panel with that of the turntable base as shown.**

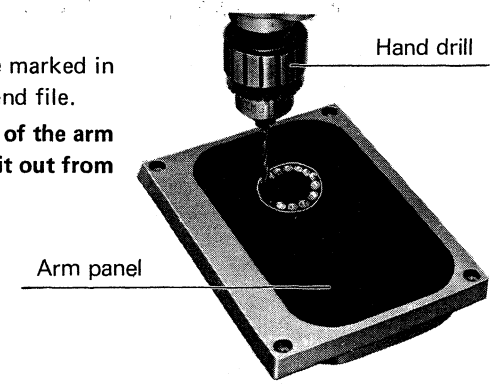
2. **Fit the template (positioning gauge for the tonearm installation) furnished with the tonearm into the center spindle of the turntable. Determine the tonearm mounting position while moving along the dotted line and mark the set position with a pencil or the like.**

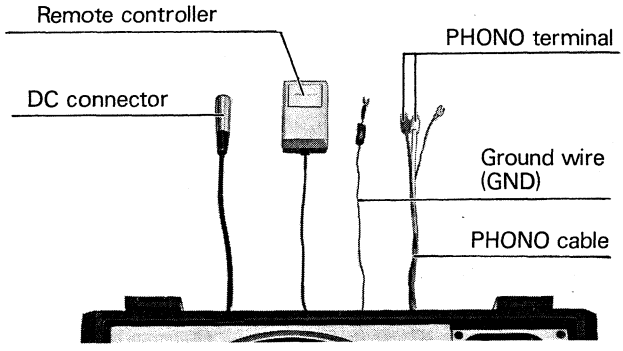
   Note:
   In the above position setting, ensure that the rear portion of the tonearm does not contact the dust cover during playing.



3. **Drill holes in the arm panel.**
Drill holes with a hand drill or the like as shown along the circumference marked in the previous item. Next cut off unnecessary portions and finish with a round file.

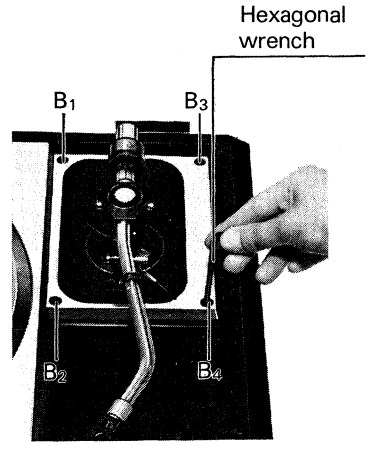
4. **Mount the tonearm on the arm panel, and pass the PHONO terminal side of the arm output cord through the surface of the turntable base. At the side pull it out from under the base.**





5. **Secure the arm panel with screws.**
Tightly secure 4 positions B_1 to B_4 with screws, using the furnished hexagonal wrench.
After the above procedure, the mounting of the tonearm has been completed.
For adjustments of the height and range of rotation of the tonearm, follow the instructions furnished with the tonearm you are using.

Note.
Should no template/positioning gauge or the like be furnished with the tonearm you are using, calculate the length from the center spindle to the tonearm installing position by subtracting the overhang length from the effective length of the tonearm. Set the tonearm according to this calculated length.

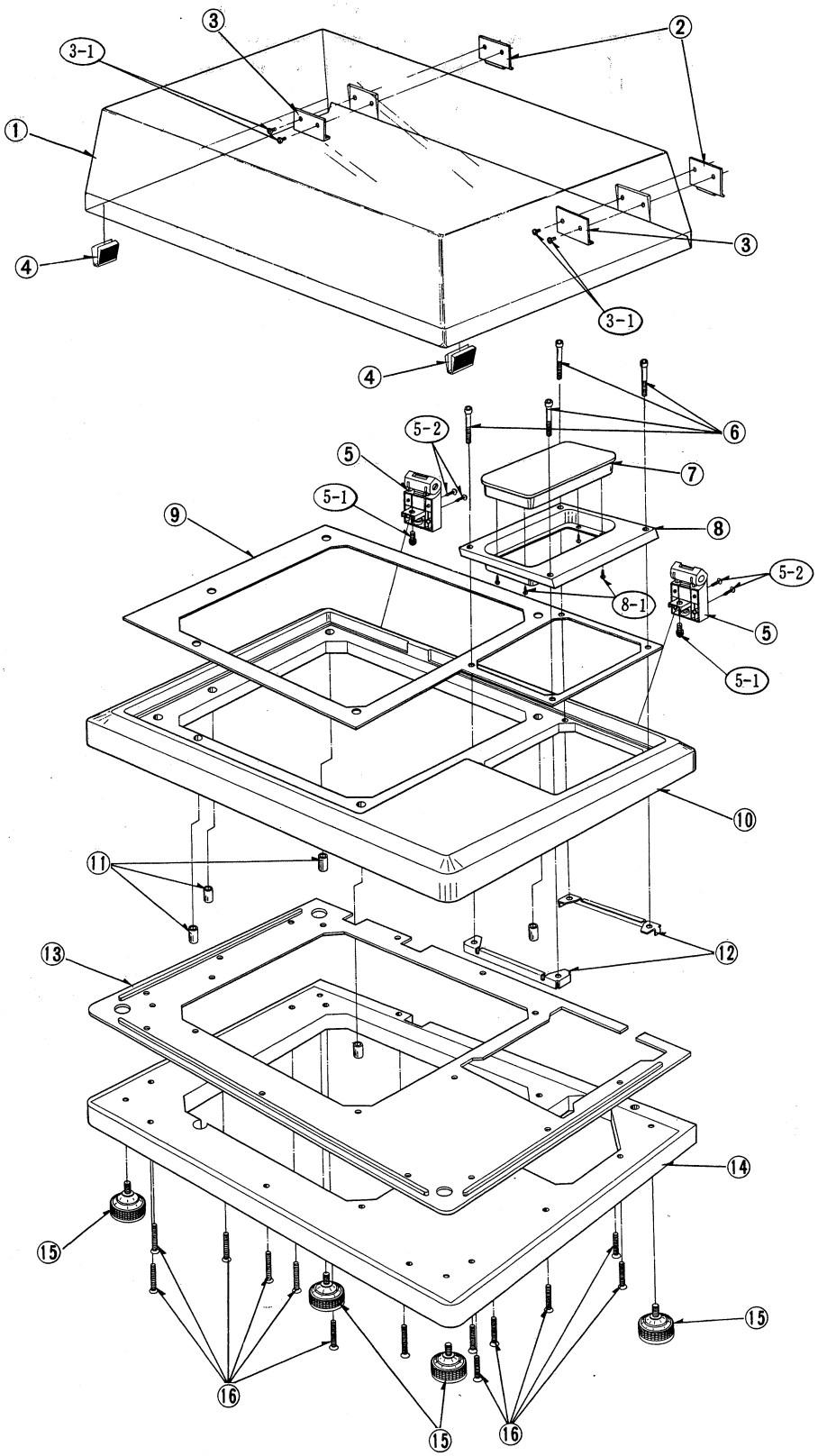


■ PARTS LIST

Ref. No.	Part No.	Description	Per Set	Remarks
1	SFAD103-01	Dust cover	1	○
2	SFUP103-02	Hinge (A)	2	○
3	SFUP103-03	Bracket, Hinge	2	○
3-1	XST4+10FZS	Screw	4	
4	SFGZ103-03	Cussion, Dust cover	2	○
5	SFAT103-01A	Hinge ass'y	2	○
5-1	XYN5+C8FZS	Screw	2	
5-2	XMC38+32FZ	Screw	4	
6	SFXG103-01	Screw, Arm Panel	4	○
7	SFAZ103-02	Arm Panel	1	○
8	SFAZ103-01	Base, Arm Panel	1	○
8-1	XMC27+16FV	Screw	4	
9	SFGZ103-01	Spacer Rubber, Turntable	1	○
10	SFAC103-01	Cabinet	1	○
11	SFGZ103-04	Tube	5	○
12	SFUP103-01	Bracket, Arm Panel	2	○
13	SFGZ103-02	Spacer Rubber, Cabinet	1	○
14	SFAU103-01	Bottom case	1	○
15	SFGA103-01A	Audio insulator ass'y	4	○
16	XMC38+32FZ	Screw	4	
17	SFNN103X01	Name Plate	1	○

Ref. No.	Part No.	Description	Per Set	Remarks
		ACCESSORY PARTS		
A1	SFNU103X01	Instruction Book	1	○
A2	SFAZ103-02	Arm Panel	1	○
A3	SFAZ103-01	Base, Arm Panel	1	○
A4	XMC27+16FV	Screw	4	○
A5	SFXZ103-01	Allen Wrench	1	
		PACKING MATERIALS		
P1	SFHP103M01	Packing case (Outer)	1	○
P2	SFHP103X02	Packing case (Inner)	1	○
P3	SFHH103-01	Side Pad (Left)	1	○
P4	SFHH103-02	Side Pad (Right)	1	○
P5	SFHD103-01	Pad, Top	1	○
P6	SFHH103-03	Pad, Arm Panel	1	○
P7	SFHD103-02	Arm Panel Pad	1	○
P8	SFHD103-03	Case, Arm Panel	1	○
P9	SFHD103-04	Pad, Arm Panel Case	1	○
P10-1	SFYF60A80	Polyethylene Pack	2	
P10-2	SFYF17A25	Polyethylene Pack	2	
P10-3	SFYF09B15	Polyethylene Pack	1	

CABINET PARTS LOCATION



Printed in Japan

ORDER NO. SD81082027C2

Service Manual

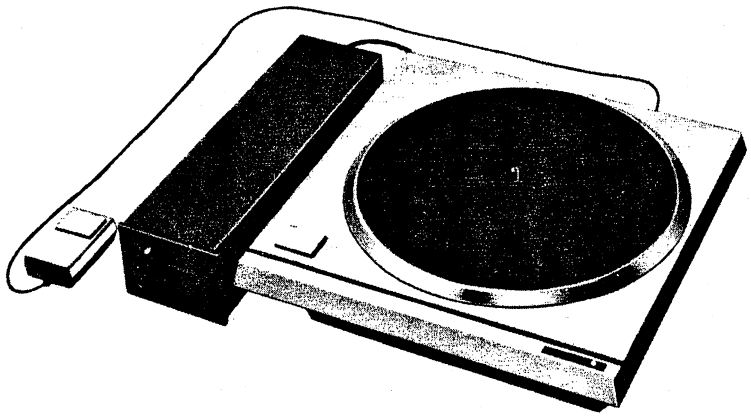
Player

SP-10MKII

[EG], [XGF]

Areas

* [EG] is available in F.R. Germany.
* [XGF] is available in France.



■ SPECIFICATIONS

Type:	Direct-drive turntable
Turntable paltter:	Aluminum diecast, diameter 32 cm (12-19/32 inches), weight 2.9 kg (6.4 lbs.), moment of inertia 380kg. cm^2 (130 lbs. in^2)
Motor:	Brushless DC motor, electronic rectification, quartz-controlled phase-locked servo circuit
Platter speeds:	33-1/3, 45 and 78.26r.p.m.
Starting torque:	6 kg. cm (5.2 lbs. in)
Build-up time	0.25 sec. (25° rotation) to 33-1/3r.p.m.
Braking time:	0.3 sec. (30° rotation) from 33-1/3r.p.m. to standstill
Speed fluctuation by load changes:	0% within 5 kg. cm (4.3 lbs. in)
Speed drift:	Within ± 0.002%
Wow & Flutter:	0.025% (JIS C5521) W.R.M.S. ±0.035% (DIN 45507), weighted, zero-to-peak
Rumble:	60 dB (IEC 179B) - 50 dB (DIN 45539A) - 70 dB (DIN 45539B)
Power Supply:	AC110/120/220/240V 50/60Hz
Power Consumption:	20 W
Dimensions:	Turntable Only 36.85 (W) x 10.25 (H) x 36.85 (D) cm (14-31/64 x 4-1/64 x 14-31/64 inches) Power Unit 110 (W) x 8.35 (H) x 37.0 (D) cm
Weight:	Turntable Only 9.5 kg (20.9 lbs.) Power Unit 3.8 kg

Specifications are subject to change without notice for further improvement.

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■ PARTS IDENTIFICATION

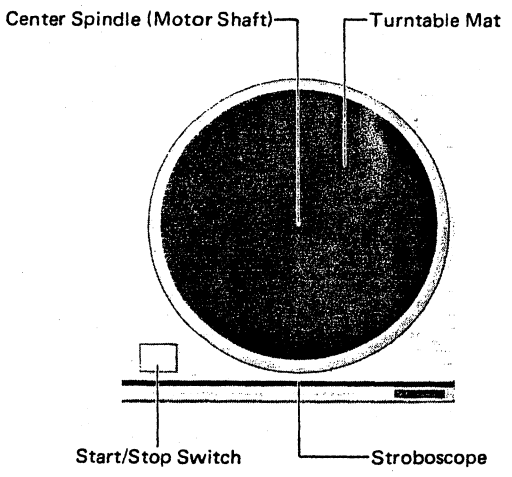


Fig. 1

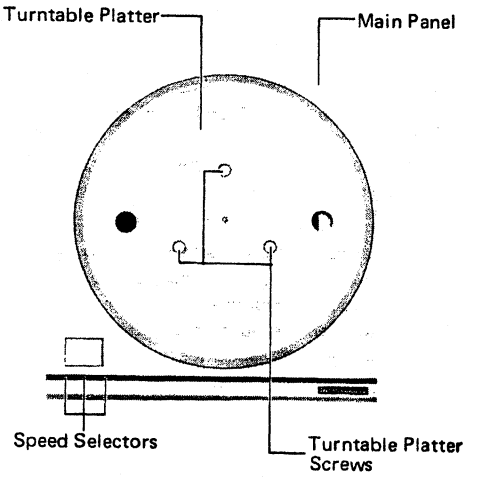


Fig. 2

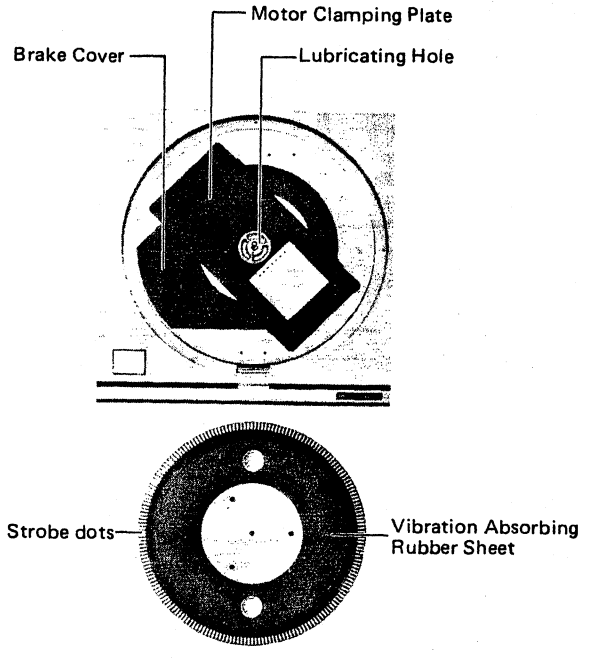


Fig. 3

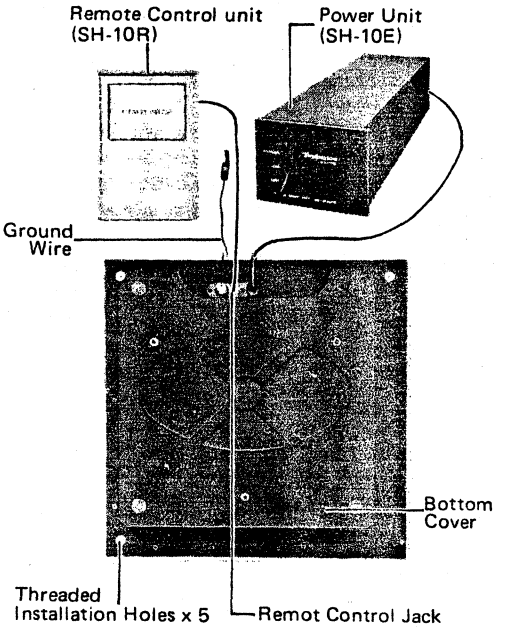


Fig. 4

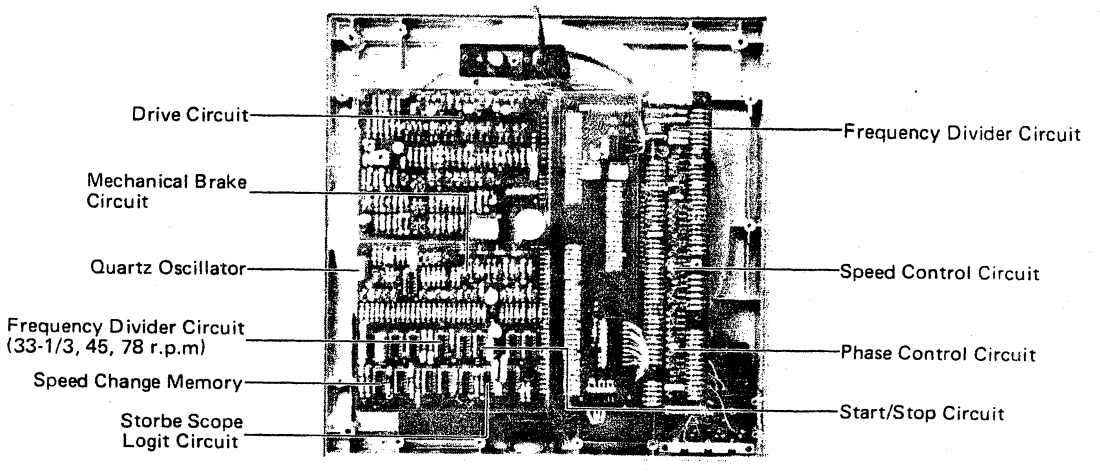


Fig. 5

■ ASSEMBLY AND SET-UP

1. Building a base or cabinet for this model

The starting torque of this model is 6Kg. cm. (5.2 1bs. in).
Thus the turntable platter which is heavy (2.9kg. 6.4 1bs.) and large (32cm. 12-19/32 inches) can be started and stopped quickly. For this reason we recommend that you use durable and heavy material. The thickness of the base should be 3cm. (1-11/64 inch) or more in order to bring out the best performance of model.

Note: Use durable and stable insulators (legs) Fig. 6 shows an example of cabinet construction.

2. Drill and cutout the bace according to the installation diagram.

As paper has a tendency to stretch we suggest that you check the diagram before using it as a template. Also check dimensions for printing errors. Check the tone arm mounting position for proper alignment (follow the tonearm manufacturers specifications). Also make sure to allow sufficient clearance for power connector and output terminals of the tone arm.

3. Install the unit in the cabinet

Two kinds of screws are included in the carton. Use the proper length of screw according to the thickness of the cabinet which you use. When you install the unit in the cabinet place proteotive material, on top of the unit to protect the center spindle from external damage. A soft cloth placed on the panel surface will protect it from scratches.

4. Remove the motor clamping plate and screws (Fig. 8)

After installation of the unit in the cabinet remove the seven blue screws and motor clamping plate.

NOTE: To protect the very delicate and important parts of the motor (spindle, motorshaft etc.) from external damage during transportation protective fittings have been installed. Be sure to remove these fittings carefully and save them for future use in case you again need to transport the unit.

NOTE: Dimensions are marked in millimeters. (25.4 mm are equal to inch.)

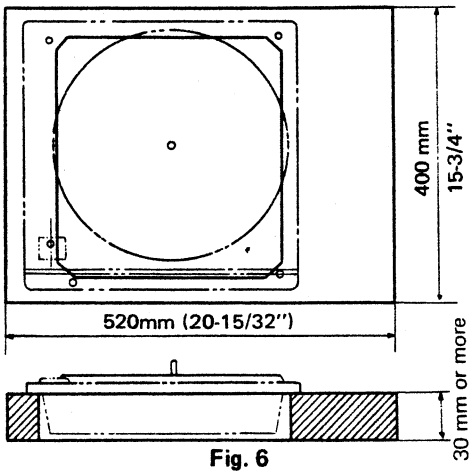


Fig. 6

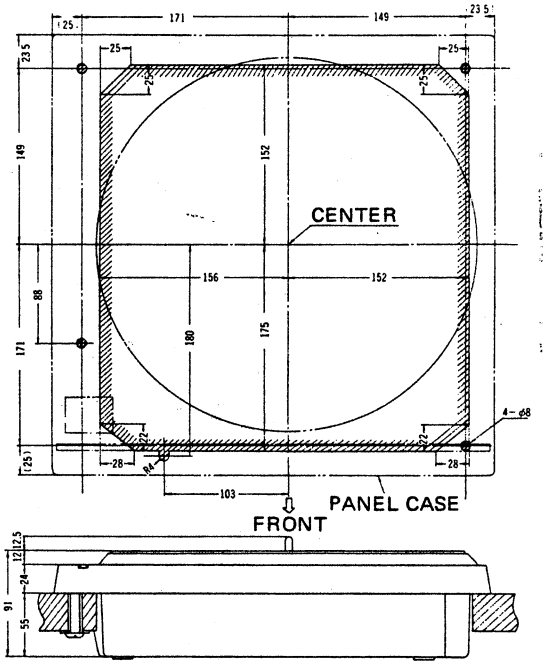


Fig. 7

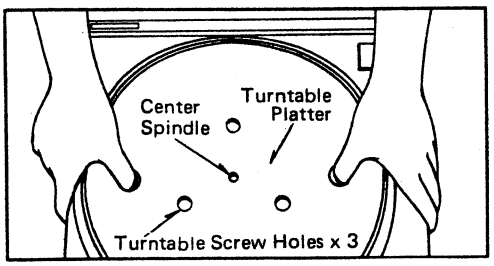


Fig. 9

5. Securing the turntable platter (Fig. 9 & 10)

Place the turntable platter on the spindle aligning holes in the platter with the rotor screw holes by eye.

Slightly lifting the turntable platter will make it easier to align the holes. Using the three screws supplied, firmly tighten the turntable platter and put the turntable mat on it.

NOTE: The turntable platter must be tightened at all three points. To assure proper operation.

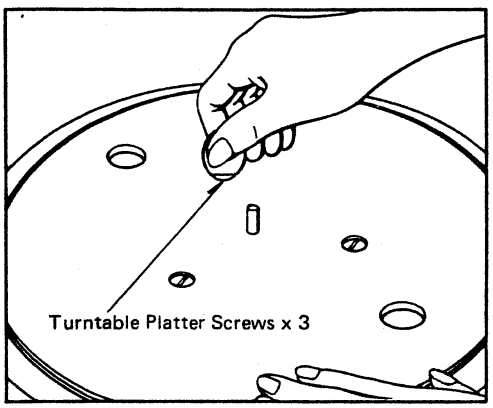


Fig. 10

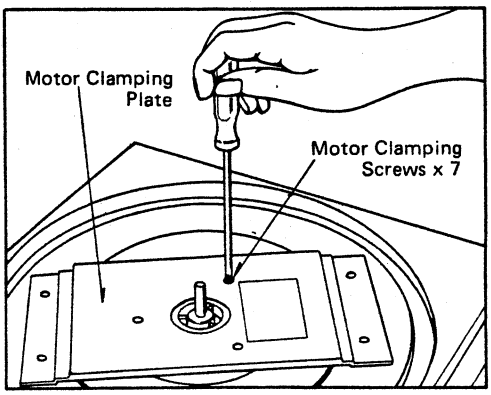


Fig. 8

■ OPERATION PRINCIPLES OF THE SP-10MKII

1. Quartz Generated Reference Signal

The quartz reference signal generator provides a reference signal which controls the action of the SP-10MKII. The oscillation of a quartz crystal is used. This oscillation is stable, highly accurate and not effected by temperature and other changes. The signal generated by the reference signal generator is split by the frequency divider into the appropriate frequency according to the speed selected.
The frequency divider is controlled by pushing the speed selector on the front panel of the unit. The selected speed information is stored in the speed change digital memory.

2. Stroboscopt Logic Circuit

The strobscope lights up the 190 stripes engraved on the platter rim. A neon lamp flashes according to instructive pulses from the stroboscope logic circuit. The circuit shapes digitally the signals from the frequency divider. This provides a sharp strobe image which is independent of external power source frequency.

3. Frequency Generator

A frequency generator is integrated with the platter drive motor. It is electromagnetic structure using a push-pull design cancels external induction. It converts accurately the platter rotation speed into a frequency. The output of the frequency generator is fed to the speed and the phase control circuits.

4. Phase Control Circuit

The phase control circuit detects a phase difference between a reference signal and a frequency generator signal and generates a control voltage. This circuit makes it possible to lock the rotation of the turntable platter to a reference signal. It improves considerably speed stability and speed control characteristics for load conditions when compared with the conventional direct-drive motor having only speed control as shown in Fig. 11 & 12.

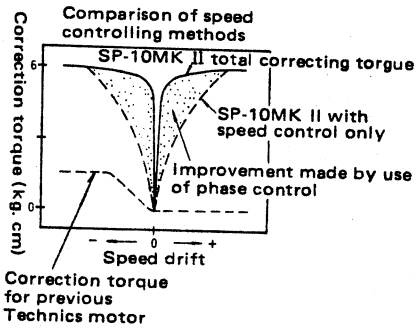

Comparison of speed controlling methods
SP-10MK II total correcting torgue
SP-10MK II with speed control only
Improvement made by use of phase control
Correction torque (kg. cm)
6
0
− 0 +
Speed drift
Correction torque for previous Technics motor

Fig. 11

5. Speed Control Circuit

The speed control circuit includes a sample-hold circuit, which converts the output of the frequency generator into an electrical voltage. This is the control voltage which maintains the platter rotation speed.

6. Drive Circuit

Two control signals are composed and applied to the drive circuit to maintain a forward motor-rotation. The drive circuit supplies fullwave drive current doubling current efficiency.
It supplies drive current in both directions for a symmetrical rotation in either a forward or reverse direction.
The drive circuit rotates the turntable platter with quick response and large starting torque.

Comparison of stability against load variations.

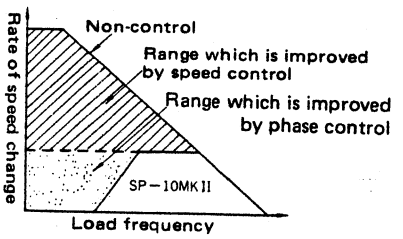


Fig. 12

7. Start/stop Circuit

When the unit is started by the switch on the front panel or by the remote control, the start/stop circuit activates the forward drive. When the unit is switched off, the start/stop circuit activates the reverse drive and the mechanical brake actuating-circuits to perform a quick stop action.

8. Mechanical Brake Actuating-Circuit

The mechanical brake actuating-circuit operates a solenoid plunger which pushes a brake shoe against the platter. Working in conjunction with the reverse drive current, the mechanical brake can bring the platter to a complete stop quickly and smoothly. A half-braking force is maintained after the platter has stopped making it easy to accomplish accurate cueing of a record.

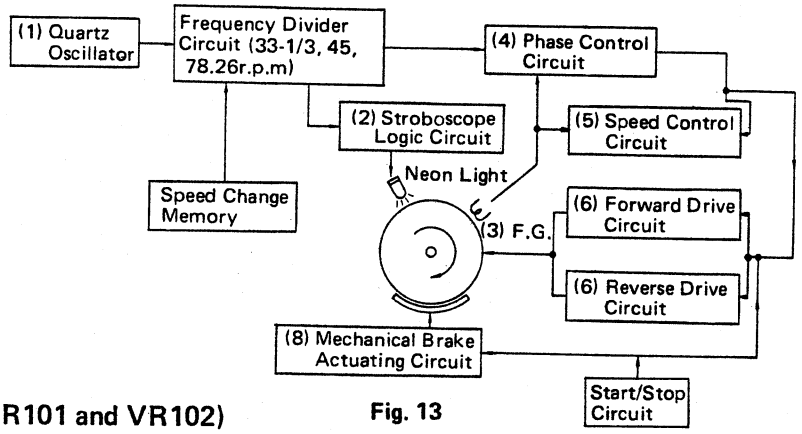


Fig. 13

■ THE PERIOD ADJUSTMENT METHOD (VR101 and VR102)

Note: If you repair the Control circuit board or the Drive Circuit board, you have to adjust VR101 and VR102.

1. Connect a dual-channel oscilloscope to points T and S on the circuit board.
   Point O is for the ground wire of the Control Circuit board.
2. Please refer to fig. 14 for the phase relation of the 2 waves for the adjustment of VR101 and VR102.
3. Please adjust in the order: 33-1/3r.p.m. 45r.p.m. 78r.p.m.

Speed Selector	Time	Adjustment Point
33-1/3 r.p.m.	6.3 ± 0.2ms	VR101
45 r.p.m.	4.7 ± 1.3ms	Confirm
78 r.p.m.	2.7 ± 0.1ms	VR102

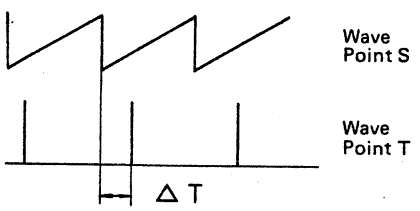


Fig. 14

■ BLOCK DIAGRAM

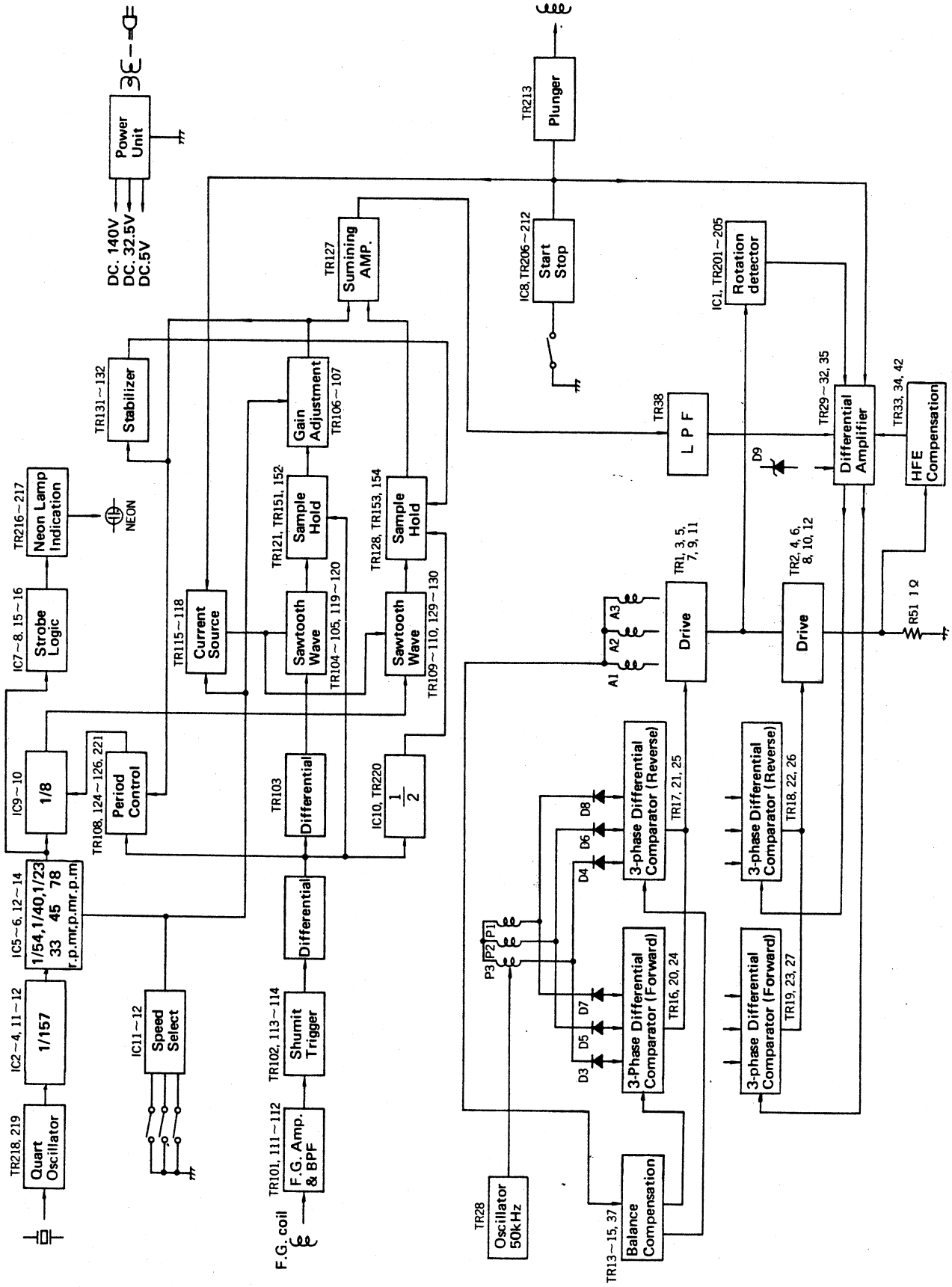
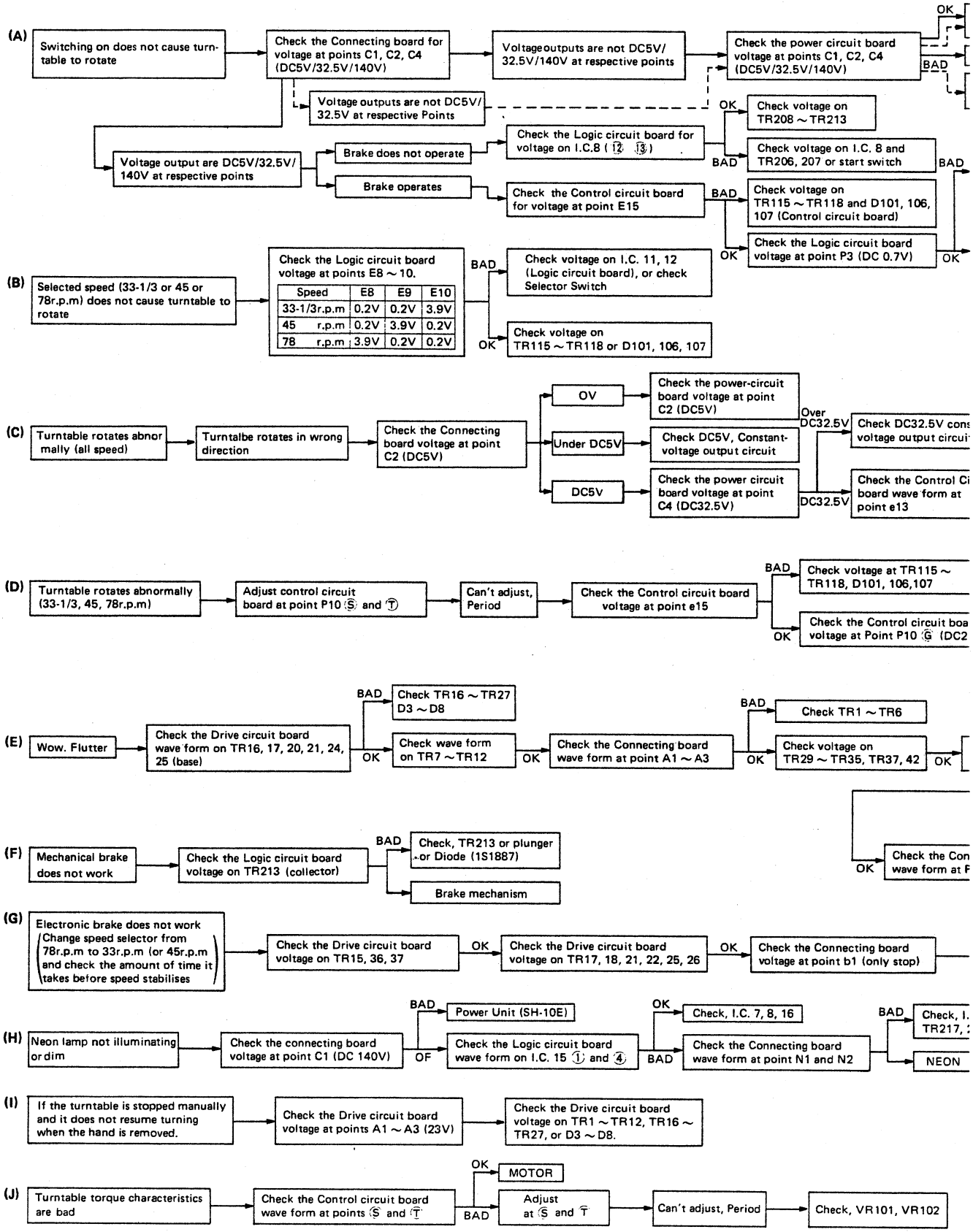
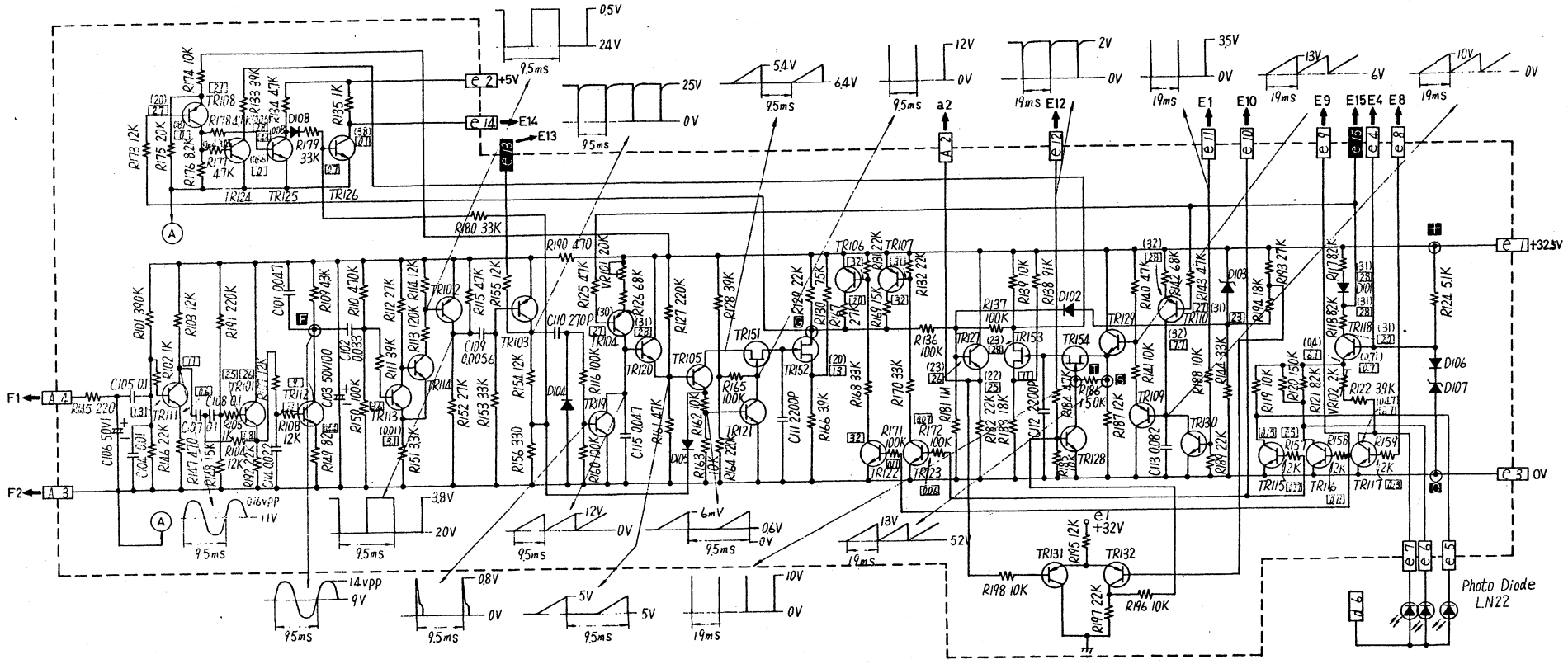


Fig. 15

■ SERVICE CHECK POINTS


(A)
Switching on does not cause turn-table to rotate
Check the Connecting board for voltage at points C1, C2, C4 (DC5V/32.5V/140V)
Voltage outputs are not DC5V/32.5V/140V at respective points
Check the power circuit board voltage at points C1, C2, C4 (DC5V/32.5V/140V)
OK
BAD
Voltage outputs are not DC5V/32.5V at respective Points
Voltage output are DC5V/32.5V/140V at respective points
Brake does not operate
Brake operates
Check the Logic circuit board for voltage on I.C.8 (12 13)
Check the Control circuit board for voltage at point E15
OK
BAD
Check voltage on TR208 ~ TR213
Check voltage on I.C. 8 and TR206, 207 or start switch
Check voltage on TR115 ~ TR118 and D101, 106, 107 (Control circuit board)
Check the Logic circuit board voltage at point P3 (DC 0.7V)
(B)
Selected speed (33-1/3 or 45 or 78r.p.m) does not cause turntable to rotate
Check the Logic circuit board voltage at points E8 ~ 10.
Speed E8 E9 E10
33-1/3r.p.m 0.2V 0.2V 3.9V
45 r.p.m 0.2V 3.9V 0.2V
78 r.p.m 3.9V 0.2V 0.2V
BAD
OK
Check voltage on I.C. 11, 12 (Logic circuit board), or check Selector Switch
Check voltage on TR115 ~ TR118 or D101, 106, 107
(C)
Turntable rotates abnormally (all speed)
Turntalbe rotates in wrong direction
Check the Connecting board voltage at point C2 (DC5V)
OV
Under DC5V
DC5V
Check the power-circuit board voltage at point C2 (DC5V)
Check DC5V, Constant-voltage output circuit
Check the power circuit board voltage at point C4 (DC32.5V)
Over DC32.5V
DC32.5V
Check DC32.5V cons voltage output circui
Check the Control Ci board wave form at point e13
(D)
Turntable rotates abnormally (33-1/3, 45, 78r.p.m)
Adjust control circuit board at point P10 S and T
Can't adjust, Period
Check the Control circuit board voltage at point e15
BAD
OK
Check voltage at TR115 ~ TR118, D101, 106,107
Check the Control circuit boa voltage at Point P10 G (DC2
(E)
Wow. Flutter
Check the Drive circuit board wave form on TR16, 17, 20, 21, 24, 25 (base)
BAD
OK
Check TR16 ~ TR27 D3 ~ D8
Check wave form on TR7 ~ TR12
Check the Connecting board wave form at point A1 ~ A3
BAD
OK
Check TR1 ~ TR6
Check voltage on TR29 ~ TR35, TR37, 42
(F)
Mechanical brake does not work
Check the Logic circuit board voltage on TR213 (collector)
BAD
Check, TR213 or plunger -or Diode (1S1887)
Brake mechanism
OK
Check the Con wave form at F
(G)
Electronic brake does not work (Change speed selector from 78r.p.m to 33r.p.m (or 45r.p.m and check the amount of time it takes before speed stabilises)
Check the Drive circuit board voltage on TR15, 36, 37
OK
Check the Drive circuit board voltage on TR17, 18, 21, 22, 25, 26
OK
Check the Connecting board voltage at point b1 (only stop)
(H)
Neon lamp not illuminating or dim
Check the connecting board voltage at point C1 (DC 140V)
BAD
Power Unit (SH-10E)
OF
Check the Logic circuit board wave form on I.C. 15 1 and 4
OK
Check, I.C. 7, 8, 16
BAD
Check the Connecting board wave form at point N1 and N2
BAD
Check, I. TR217, :
NEON
(I)
If the turntable is stopped manually and it does not resume turning when the hand is removed.
Check the Drive circuit board voltage at points A1 ~ A3 (23V)
Check the Drive circuit board voltage on TR1 ~ TR12, TR16 ~ TR27, or D3 ~ D8.
(J)
Turntable torque characteristics are bad
Check the Control circuit board wave form at points S and T
OK
MOTOR
BAD
Adjust at S and T
Can't adjust, Period
Check, VR101, VR102

Schematic Diagram (Control Circuit) ..... Model SP-10MKII



Notes: 1. Values shown are with reference to the chassis, measured by DC voltmeter.

□ . . . . . .voltage during 33-1/3 rpm.

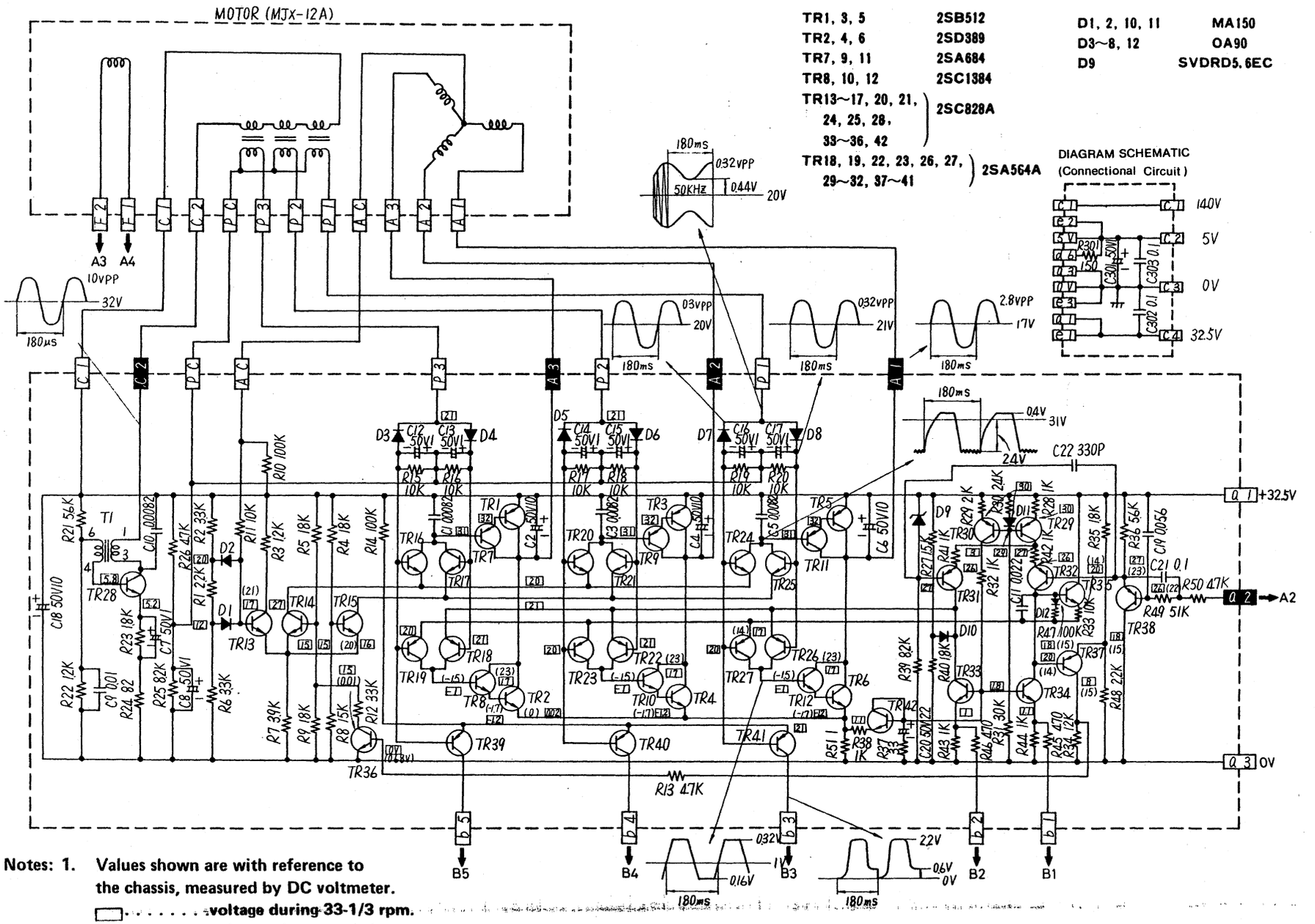
( ) . . . . . .voltage when stopped.

Waveforms are during 33-1/3 rpm.

TR102~110, 131, 132	2SA564A
TR101, 111~130	2SC828A
TR151~154	2SK30A
D101, 102, 104, 105, 106, 108	MA150
D103	SVDRD9.1EBS
D107	SVDRD5.6ECS

This schematic diagram maybe modified at any time with the development of new technology.

Schematic Diagram (Drive Circuit) ..... Model SP-10MKII



Notes: 1. Values shown are with reference to the chassis, measured by DC voltmeter.

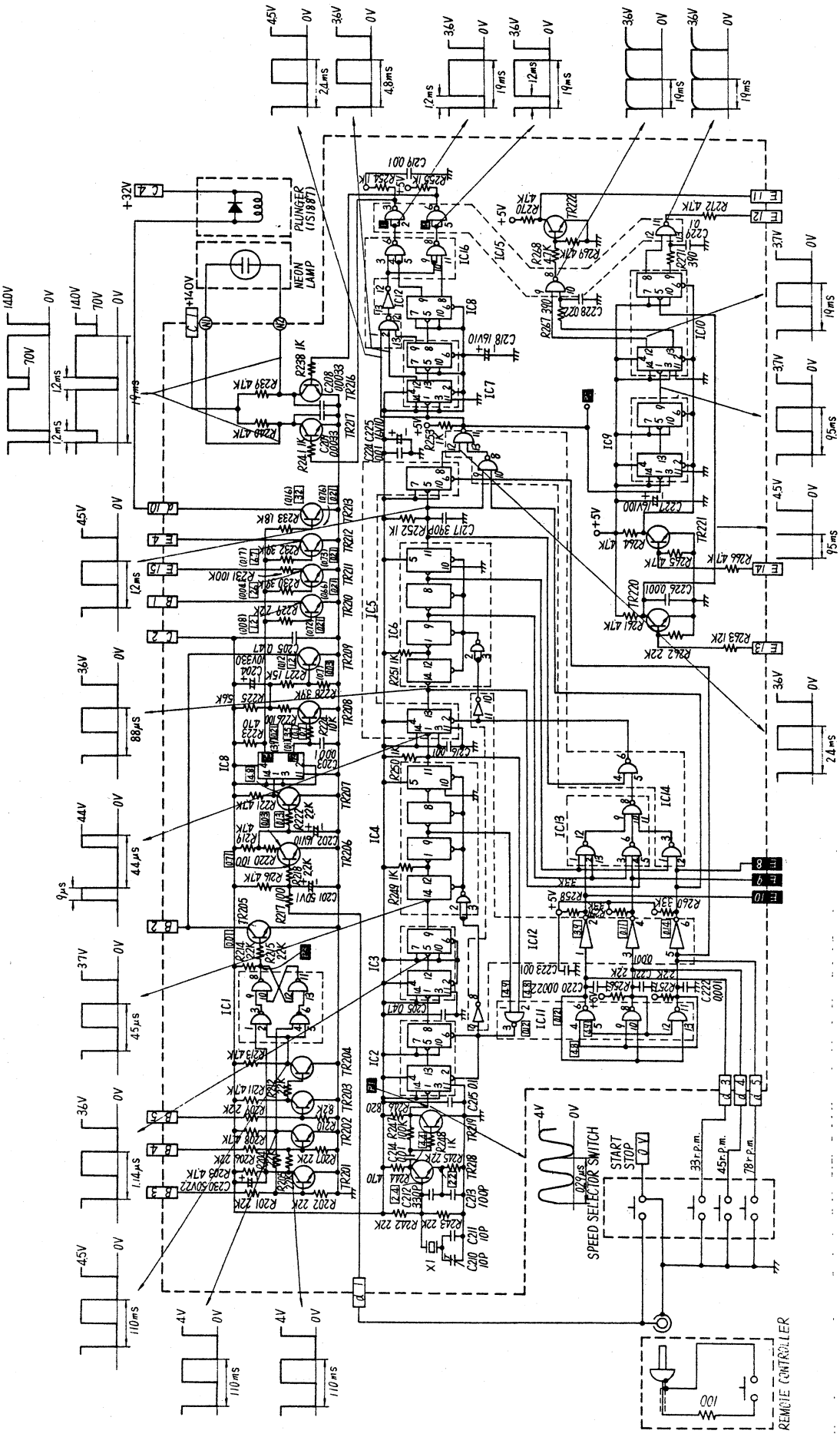
□ . . . . . voltage during 33-1/3 rpm.

( ) . . . . . voltage when stopped.

Waveforms are during 33-1/3 rpm.

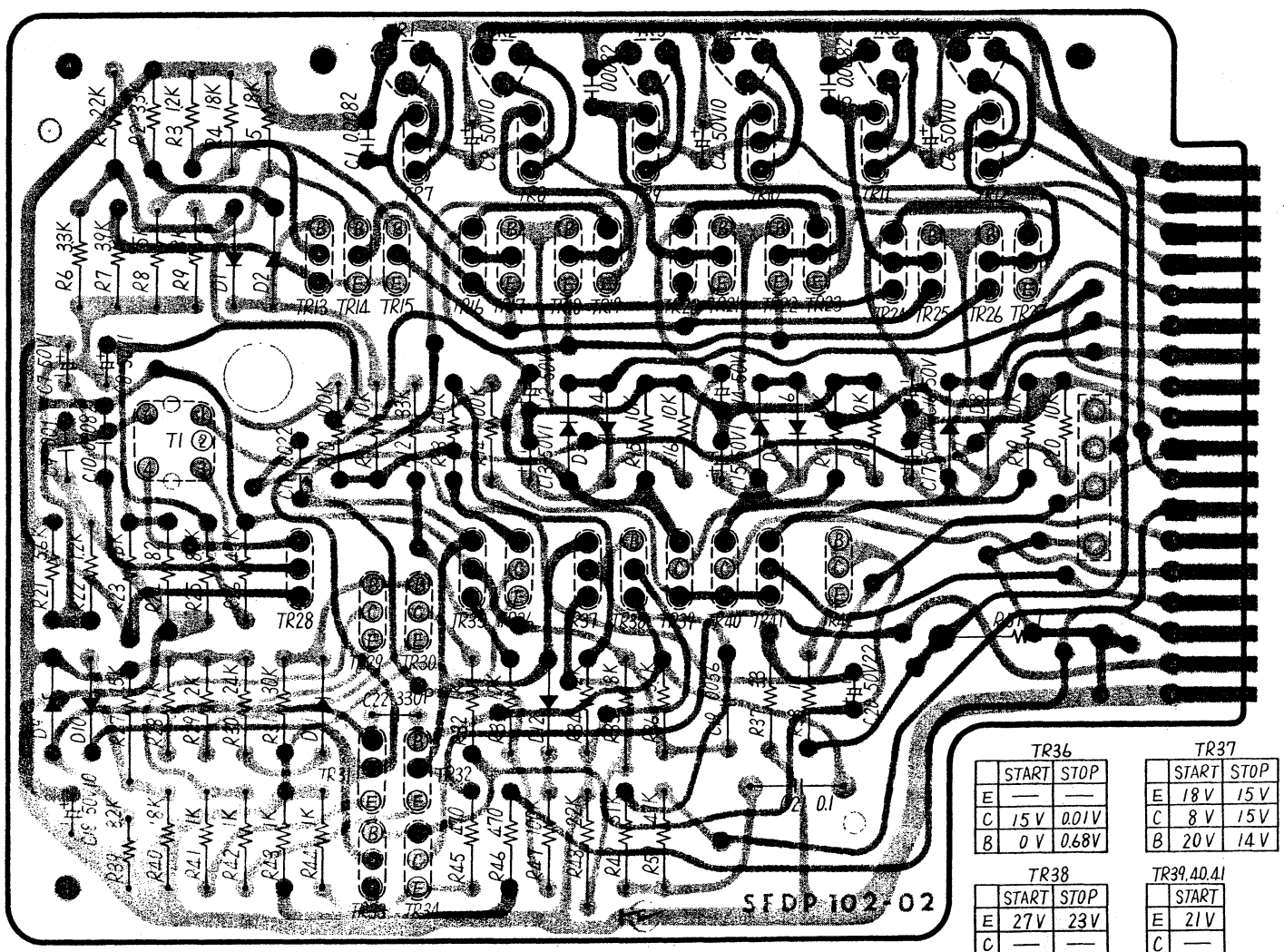
This schematic diagram maybe modified at any time with the development of new technology.

Schematic Diagram (Logic Circuit) ..... Model SP-10MKII



Printed circuit board pattern seen from above.

Circuit Board Wiring View (Drive Circuit) ..... Model SP-10MKII



TR1.3.5

	START
E	—
C	17V
B	32V

TR7.9.11

	START
E	32V
C	17V
B	31V

TR2.4.6

	START	STOP
E	0.02V	0V
C	17V	23V
B	-1.2V	-1.7V

TR8.10.12

	START	STOP
E	-1.2V	-1.7V
C	17V	23V
B	-1V	-1.5V

TR13

	START
E	16V
C	27V
B	17V

TR14

	START
E	16V
C	20V
B	15V

TR15

	START
E	16V
C	21V
B	15V

TR16.20

	START
E	20V
C	31V
B	20V

TR17.21

	START
E	21V
C	31V
B	21V

TR24

	START
E	20V
C	31V
B	20V

TR18.22

	START	STOP
E	17V	14V
C	-1V	-15V
B	21V	—

TR19.23

	START	STOP
E	17V	14V
C	-1V	-15V
B	20V	—

TR25

	START
E	21V
C	31V
B	—

TR28

	START
E	5.2V
C	—
B	5.8V

TR26

	START	STOP
E	17V	14V
C	-1V	1.5V
B	—	—

TR27

	START	STOP
E	17V	14V
C	-1V	-1.5V
B	20V	—

TR29

	START
E	30V
C	27V
B	29V

TR30

	START
E	30V
C	3V
B	29V

TR31

	START
E	26V
C	17V
B	27V

TR33

	START
E	1V
C	17V
B	1.8V

TR32

	START	STOP
E	26V	—
C	20V	14V
B	27V	23V

TR36

	START	STOP
E	—	—
C	15V	0.01V
B	0V	0.68V

TR37

	START	STOP
E	18V	15V
C	8V	15V
B	20V	14V

TR34

	START
E	1.1V
C	20V
B	1.8V

TR42

	START
E	1.1V
C	1.8V
B	1.8V

TR38

	START	STOP
E	27V	23V
C	—	—
B	26V	22V

TR39.40.41

	START
E	21V
C	—
B	20V

TR35

	START	STOP
E	20V	14V
C	—	—
B	18V	15V

C	0.01V
B	—

C	0.03V
B	0.71V

IC12

	START
2	3.9V
4	0.1V
6	0.14V

TR207

	START
E	—
C	4.8V
B	0.13V

IC8

	START	STOP
12	3.5V	0.1V
13	0.21V	3.9V

TR209

	START	STOP
E	—	—
C	1.2V	0.12V
B	0.03V	0.7V

TR210

	START	STOP
E	—	—
C	1.2V	0.08V
B	0.21V	0.72V

TR211

	START	STOP
E	—	—
C	2.6V	0.04V
B	0.21V	0.66V

IC11

	START
1	4.9V
2	4.8V
3	0.12V
4	4.8V
5	4.9V
6	0.12V

TR212

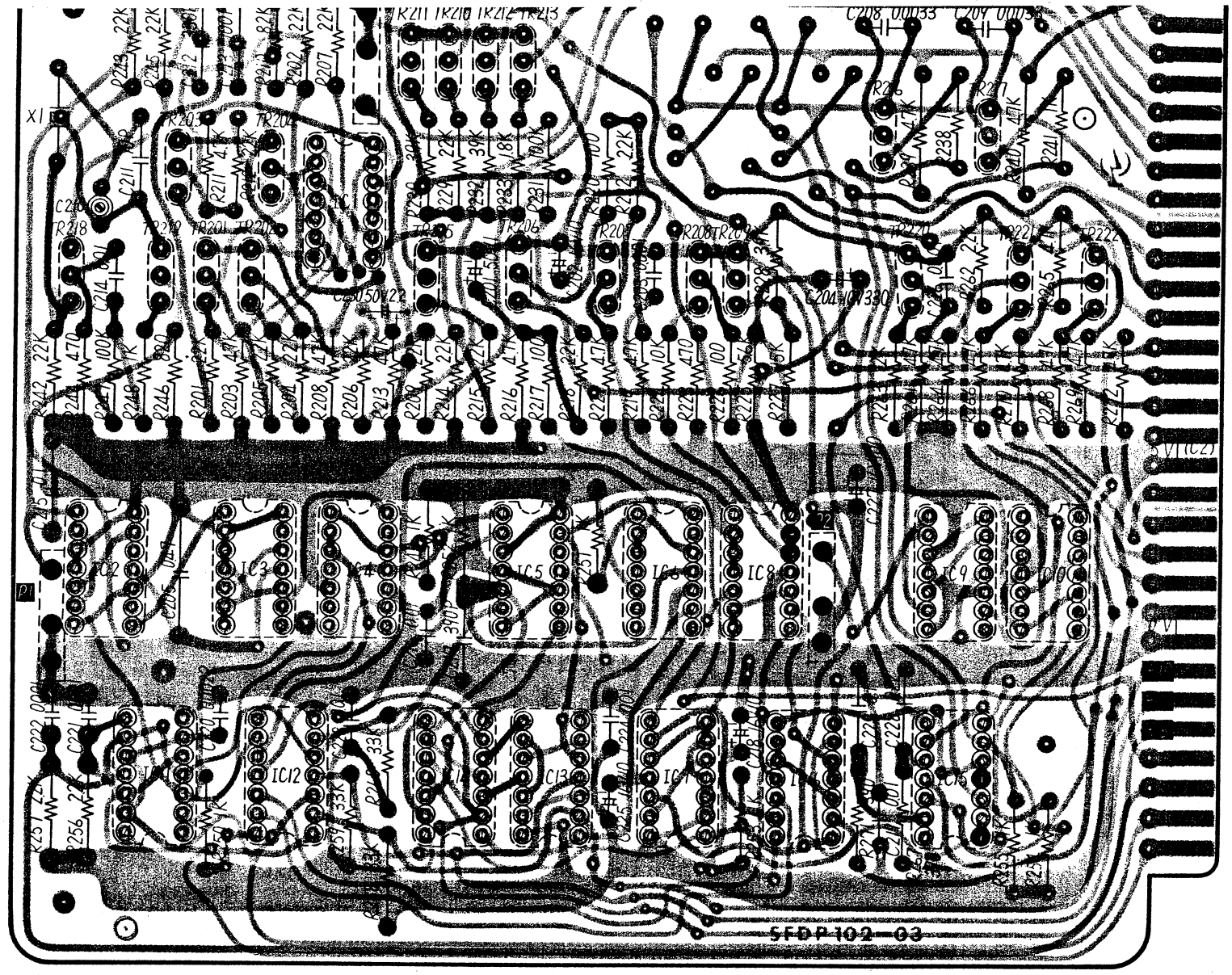
	START	STOP
E	—	—
C	6.7V	0.17V
B	0.21V	0.73V

TR218

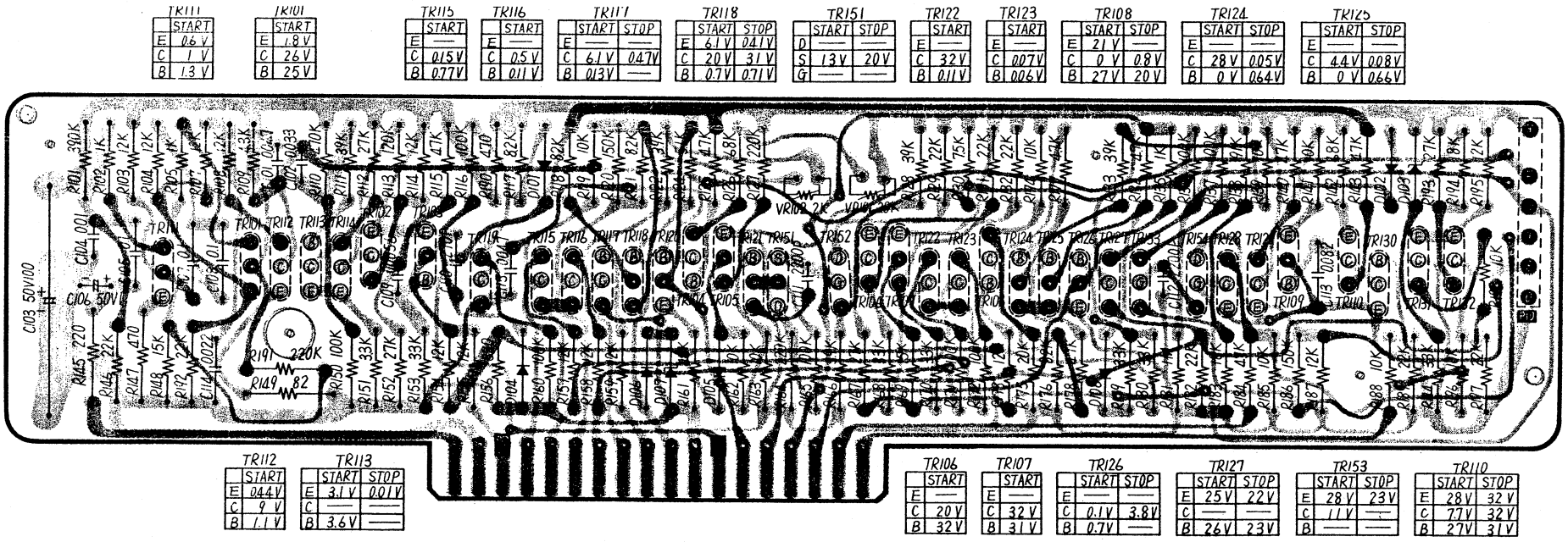
	START
E	2.2V
C	4.4V
B	2.4V

TR213

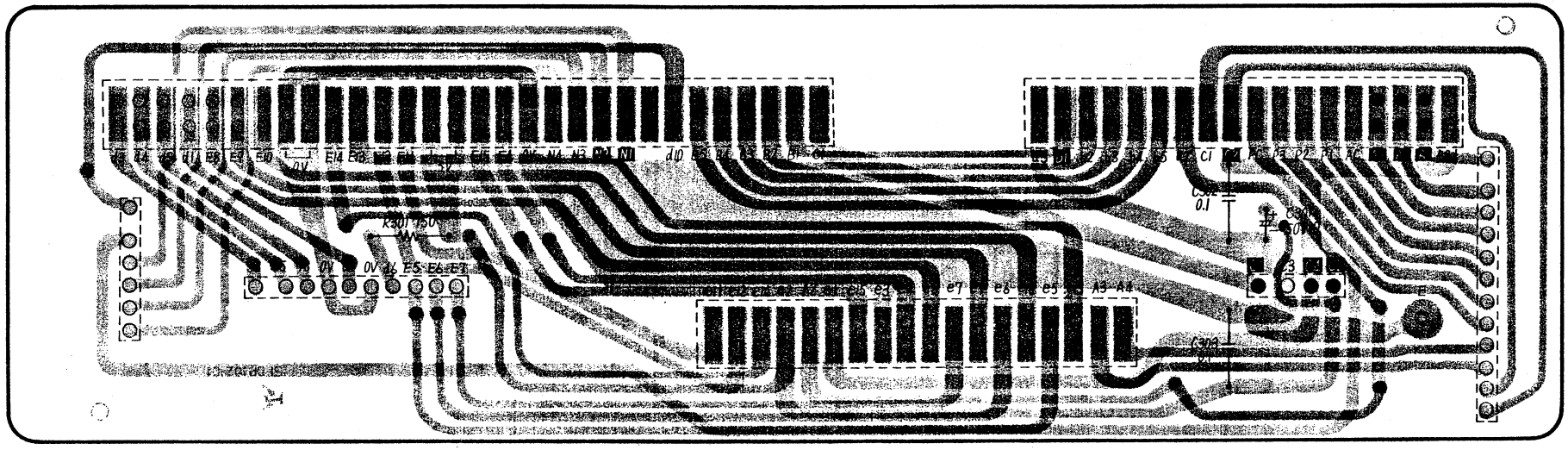
	START	STOP
E	—	—
C	32V	0.16V
B	0.21V	0.76V



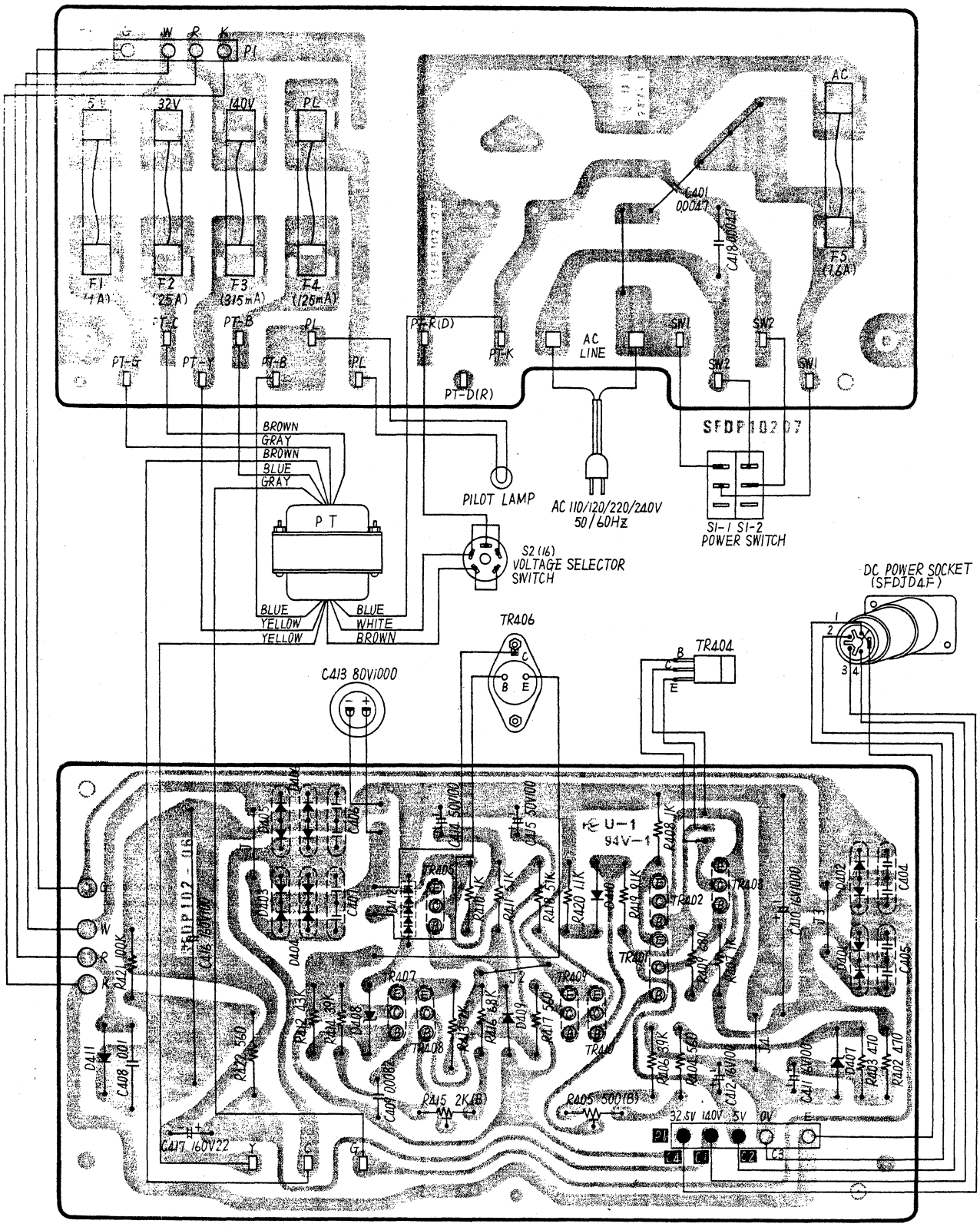
Circuit Board Wiring View (Control Circuit) ..... Model SP-10MKII


TR111 START E 0.6V C 1V B 1.3V
TR101 START E 1.8V C 2.6V B 2.5V
TR115 START E — C 0.15V B 0.77V
TR116 START E — C 0.5V B 0.11V
TR117 START STOP E — — C 6.1V 0.47V B 0.13V —
TR118 START STOP E 6.1V 0.41V C 2.0V 3.1V B 0.7V 0.71V
TR151 START STOP D — — S 1.3V 2.0V G — —
TR122 START E — C 3.2V B 0.11V
TR123 START E — C 0.07V B 0.06V
TR108 START STOP E 2.1V — C 0V 0.8V B 2.7V 2.0V
TR124 START STOP E — — C 2.8V 0.05V B 0V 0.64V
TR125 START STOP E — — C 4.4V 0.08V B 0V 0.66V
TR112 START E 0.44V C 9V B 1.1V
TR113 START STOP E 3.1V 0.01V C — — B 3.6V —
TR106 START E — C 2.0V B 3.2V
TR107 START E — C 3.2V B 3.1V
TR126 START STOP E — — C 0.1V 3.8V B 0.7V —
TR127 START STOP E 2.5V 2.2V C — — B 2.6V 2.3V
TR153 START STOP E 2.8V 2.3V C 1.1V — B — —
TR110 START STOP E 2.8V 3.2V C 7.7V 3.2V B 2.7V 3.1V

Circuit Board Wiring View (Connectional Circuit) ..... Model SP-10MKII



Circuit Board Wiring View ..... Power Unit〔SH-10E〕



TR401 402	START
E	4.3V
C	1 V
B	5 V

TR403	START
E	11 V
C	5.7V
B	11 V

TR404	START
E	5 V
C	11 V
B	5.7V

TR405	START
E	33 V
C	51 V
B	34 V

TR406	START
E	325 V
C	48 V
B	33 V

TR407	START
E	18 V
C	325V
B	19 V

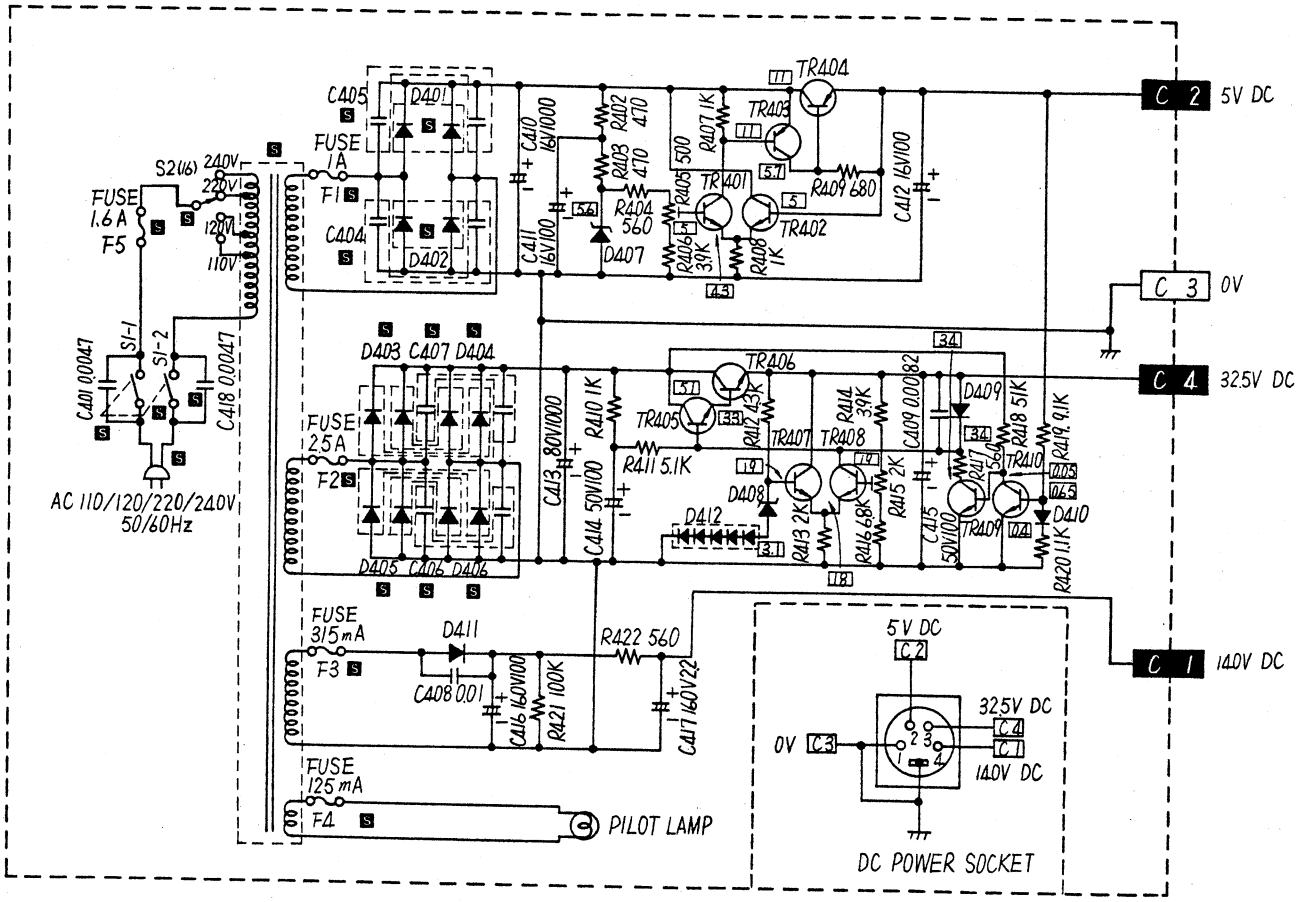
TR408	START
E	18 V
C	34 V
B	19 V

TR409	START
E	3.1 V
C	34 V
B	0.05V

TR410	START
E	3.1 V
C	0.05V
B	0.65V

Schematic Diagram ..... Power Unit [SH-10E]

Notes: **S** indicates that only parts specified by the manufacture be used for replacement in critical circuits.



■ PACKING PARTS

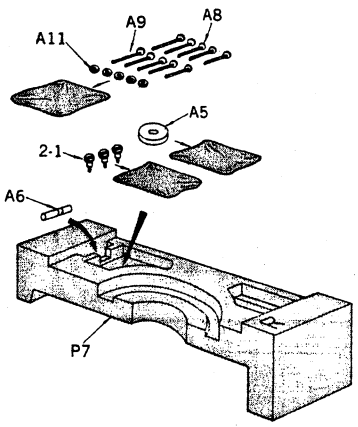


Fig. 16

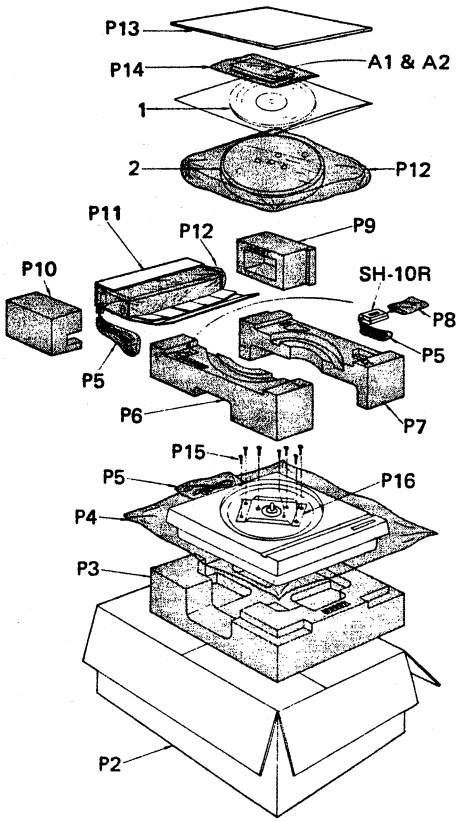


Fig. 17

Exploded View of Turntable ..... Model SP-10MKII

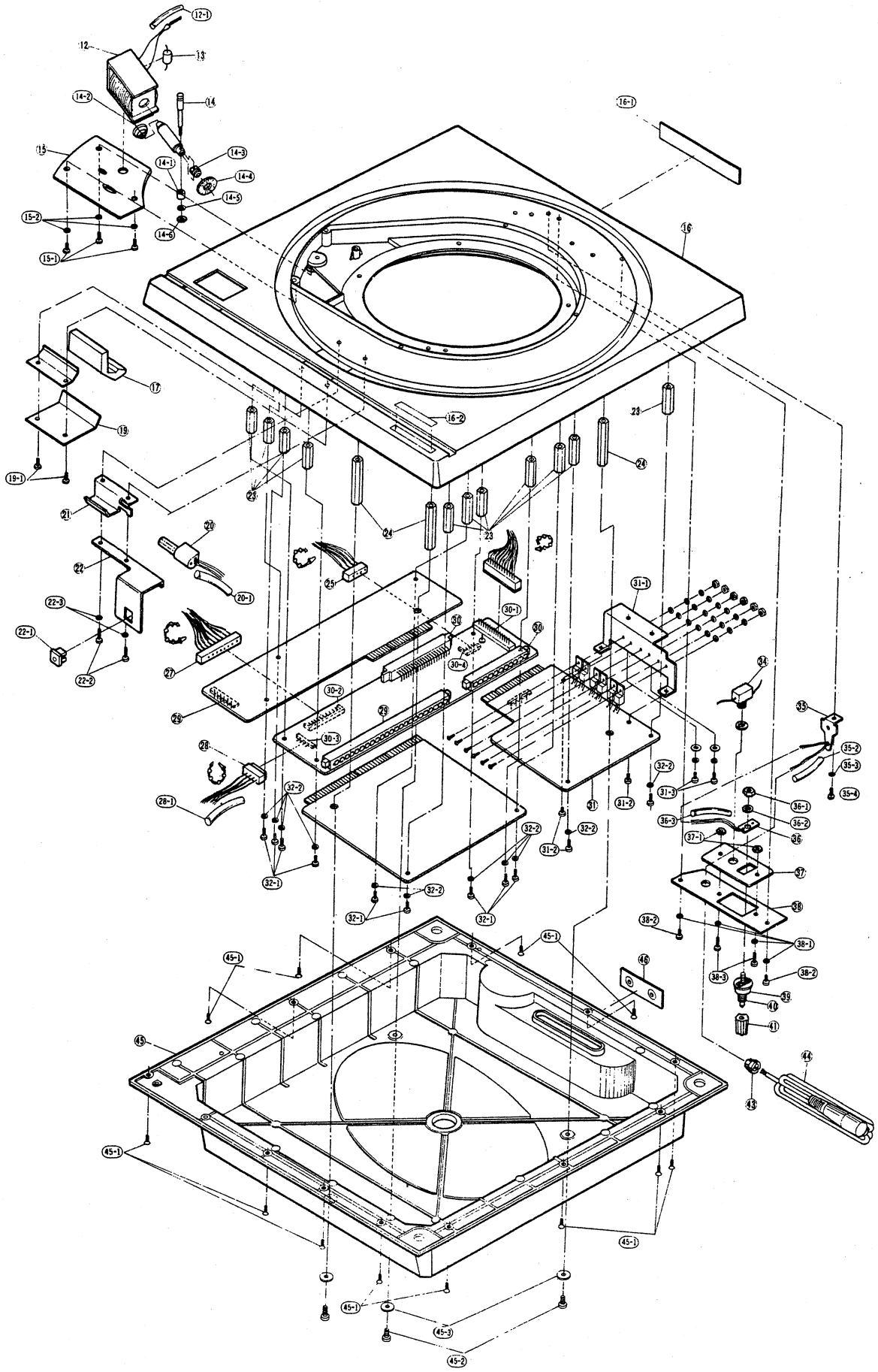


Fig. 18

Exploded View of Turntable ..... Model SP-10MKII

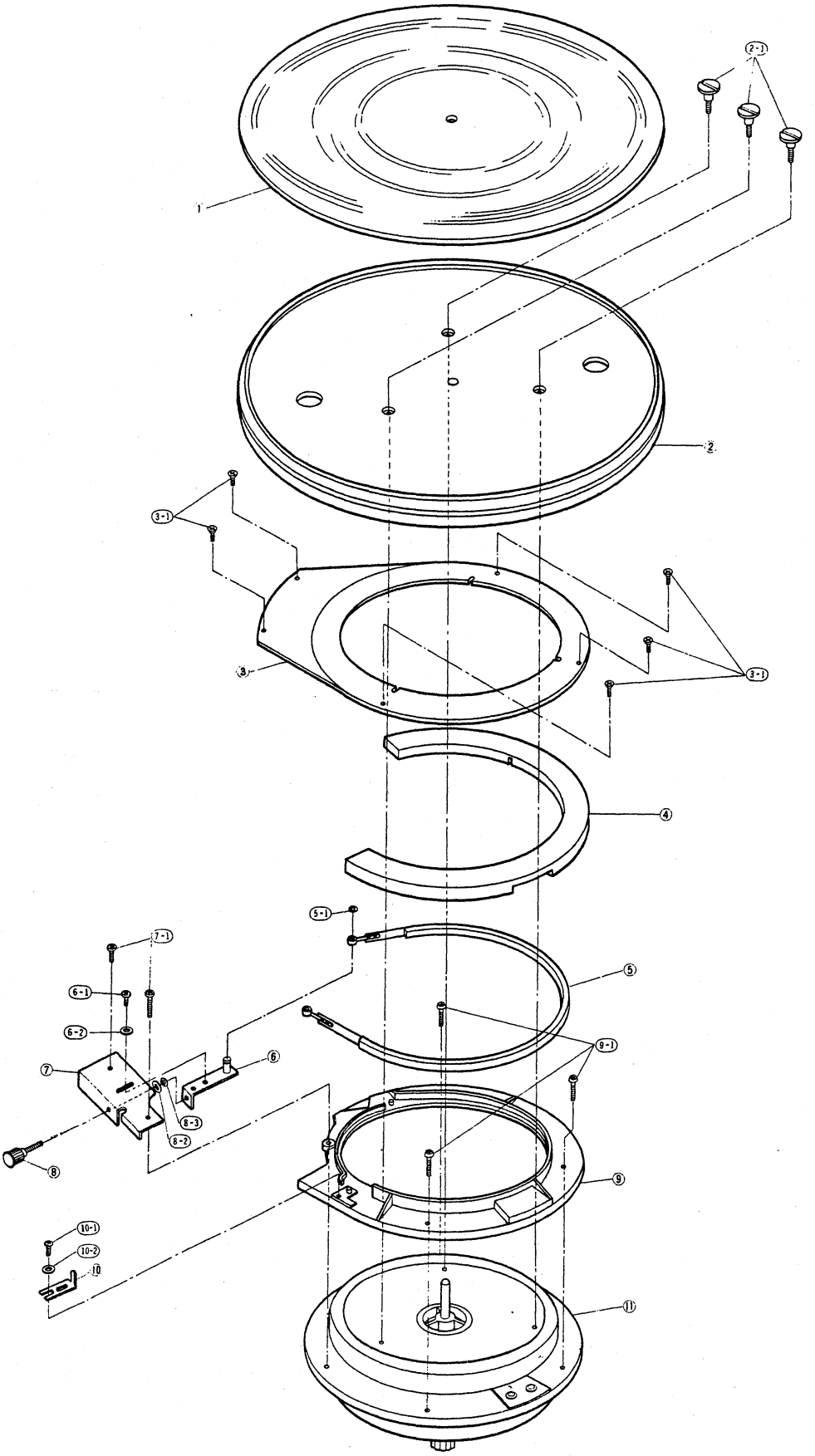


Fig. 19

Exploded View of Power Unit ..... Model SH-10E

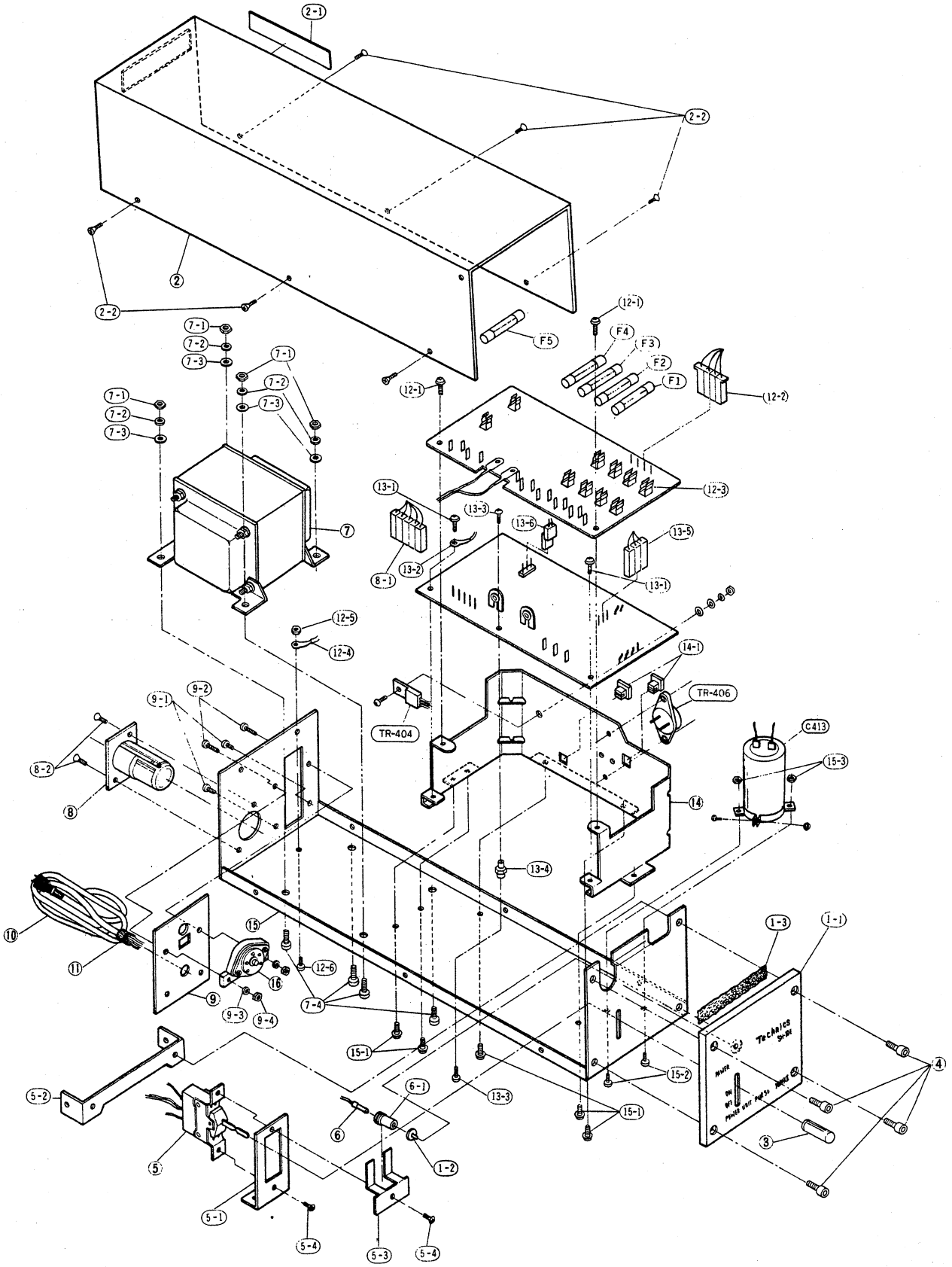


Fig. 20

NOTES: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice:
Components indentified by ⚠ marke have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
DRIVE CIRCUIT BOARD				
Transistors				
TR1, 3, 5	**2SB512A–P**	Transistor	3	
TR2, 4, 6	**2SD390AQ**	Transistor	3	FTD
TR7, 9, 11	**2SA684–QNC**	Transistor	3	
TR13 ~ 17, 20, 21, 24, 25, 28, 33 ~ 36, 42	**2SC1328–T**	Transistor	15	
TR18, 19, 22, 23, 27, 29 ~ 32, 37 ~ 41	**2SA722–S**	Transistor	15	
Diodes				
D1, 2, 10, 11	**MA162A**	Diode	4	
D3 ~ 8, 12	**20A90**	Diode	7	ARD
D9	SVDRD5.6ECS	Diode	1	
Transformer				
T1	ELM10S123	Oscillator	1	
Resistors				
R28, 38, 43, 44	**ERO50CKF1001**	Metallic, 1/2W, 1kΩ, ± 1%	4	
R29	**ERO50CKF2001**	Metallic, 1/2W, 1kΩ, ± 1%	1	
R51	**ERX2ANJ1R0**	Metallic, 2W, 1Ω, ± 5%	1	
R37	**ERX2ANJ3R3**	Metallic 1/2W, 3.3Ω, ± 5%	1	
R24	**ERD50FJ820**	Carbon, 1/2W, 82Ω, ± 5%	1	
R3, 22	**ERD50FJ122**	Carbon, 1/2W, 1.2kΩ, ± 5%	2	
R27	**ERD50FJ152**	Carbon, 1/2W, 1.5kΩ, ± 5%	1	
R23, 35, 40	**ERD50FJ182**	Carbon, 1/2W, 1.8kΩ, ± 5%	3	
R48	**ERD50FJ222**	Carbon, 1/2W, 2.2kΩ, ± 5%	1	
R1	**ERD25FJ222**	Carbon, 1/4W, 2.2kΩ, ± 5%	1	
R30	**ERD25FJ242**	Carbon, 1/4W, 2.4kΩ, ± 5%	1	
R2, 6	**ERD25FJ332**	Carbon, 1/4W, 3.3kΩ, ± 5%	2	
R7	**ERD25FJ392**	Carbon, 1/4W, 3.9kΩ, ± 5%	1	
R26	**ERD25FJ472**	Carbon, 1/4W, 4.7kΩ, ± 5%	1	
R21, 36	**ERD25FJ562**	Carbon, 1/4W, 5.6kΩ, ± 5%	2	
R45, 46	**ERD25FJ471**	Carbon, 1/4W, 470Ω, ± 5%	2	
R32, 41, 42	**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ± 5%	3	
R25, 39	**ERD25FJ822**	Carbon, 1/4W, 8.2kΩ, ± 5%	2	
R11, 15, 16, 17, 18, 19, 20, 33	**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ± 5%	8	
R34	**ERD25TJ123**	Carbon, 1/4W, 12kΩ, ± 5%	1	
R8	**ERD25TJ153**	Carbon, 1/4W, 15kΩ, ± 5%	1	
R4, 5, 9	**ERD25TJ183**	Carbon, 1/4W, 18kΩ, ± 5%	3	
R31	**ERD25TJ303**	Carbon, 1/4W, 30kΩ, ± 5%	1	
R12	**ERD25TJ333**	Carbon, 1/4W, 33kΩ, ± 5%	1	
R13, 50	**ERD25TJ473**	Carbon, 1/4W, 47kΩ, ± 5%	2	
R49	**ERD25TJ513**	Carbon, 1/4W, 51kΩ, ± 5%	1	
R10, 14, 47	**ERD25TJ104**	Carbon, 1/4W, 100kΩ, ± 5%	3	
Capacitors				
C22	**ECQS1331JZ**	Styrol 125V, 330pF, ± 5%	1	ARD
C1, 3, 5, 10	**ECQM1H822JZ**	Polyester, 50V, 0.0082μF, ± 5%	1	ARD
C9	**ECQM1H103JZ**	Polyseter, 50V, 0.01μF, ± 5%	1	ARD
C11	**ECQM1H223JZ**	Polyester, 50V, 0.022μF, ± 5%	1	ARD
C19	**ECQM1H563JZ**	Polyester, 50V, 0.056μF, ± 5%	1	ARD
C21	**ECQM1H104JZ**	Polyester, 50V, 0.1μF, ± 5%	1	ARD
C7, 8, 12, 13, 14, 15, 16, 17	**ECEA50Z1**	Electrolytic, 50V, 1μF	8	
C20	**ECEA50Z2R2**	Electrolytic, 50V, 2.2μF,	1	
C2, 4, 6, 18	**ECEA1HS100**	Electrolytic, 50V, 10μF	4	
LOGIC CIRCUIT BOARD				
Intergrated Circuits				
IC1, 14, 15	SVIM53200P	Intergrated Circuit.	1	
IC2, 3, 5, 7, 8, 9, 10	SVIM53273P	Intergrated Circuit	7	
IC4, 6	SVIM53293P	Intergrated Circuit	2	
IC11	SVIM5946P	Intergrated Circuit	1	
IC12	SVIM53204P	Intergrated Circuit	1	
IC13, 16	SVIM53210P	Intergrated Circuit	2	
Transistors				
TR201 ~ 212, 218 ~ 222	**2SC1328–T**	Transistors	17	
TR213	**2SC1384AR**	Transistors	1	FTD
TR216, 217	**2SC1573–Q**	Transistors	2	MTD
Resistors				
R210, 220, 226	**ERD25FJ101**	Carbon, 1/4W, 100Ω, ± 5%	3	
R267, 271	**ERD25FJ391**	Carbon, 1/4W, 390Ω, ± 5%	2	
R223, 224	**ERD25FJ471**	Carbon, 1/4W, 470Ω, ± 5%	2	
R246	**ERD25FJ821**	Carbon, 1/4W, 820Ω, ± 5%	1	
R238, 241, 248, 249 ~ 255	**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ± 5%	10	
R233	**ERD25FJ182**	Carbon, 1/4W, 1.8kΩ, ± 5%	1	
R214, 218, 222, 246, 256, 257, 262	**ERD25FJ222**	Carbon, 1/4W, 2.2kΩ, ± 5%	7	
R258, 259, 260	**ERD25FJ332**	Carbon, 1/4W, 3.3kΩ, ± 5%	3	
R228	**ERD25FJ392**	Carbon, 1/4W, 3.9kΩ, ± 5%	1	
R203, 208, 211, 213, 216, 219, 221, 261, 264, 265, 266, 268, 269, 270, 272	**ERD25FJ472**	Carbon, 1/4W, 4.7kΩ, ± 5%	15	
R225	**ERD25FJ562**	Carbon, 1/4W, 5.6kΩ, ± 5%	1	
R210	**ERD25FJ822**	Carbon, 1/4W, 8.2kΩ, ± 5%	1	
R224	**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ± 5%	1	
R263	**ERD25TJ123**	Carbon, 1/4W, 12kΩ, ± 5%	1	
R227	**ERD25TJ153**	Carbon, 1/4W, 15kΩ, ± 5%	1	
R201, 202, 204 ~ 207, 209, 212, 215, 229, 242, 243	**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ± 5%	12	
R230, 232	**ERD25TJ393**	Carbon, 1/4W, 39kΩ, ± 5%	2	
R231, 247	**ERD25TJ104**	Carbon, 1/4W, 100kΩ, ± 5%	2	
R239, 240	**ERG1ANJ472**	Metallic, 1W, 4.7kΩ, ± 5%	2	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
Capacitors				
C203, 221, 222, 226	**ECQM1H102JZ**	Polyester, 50V, 0.001μF, ± 5%	4	ARD
C220	**ECQM1H222JZ**	Polyester, 50V, 0.0022μF, ± 5%	1	ARD
C214, 216, 219, 223, 224	**ECQM1H103JZ**	Polyester, 50V, 0.01μF, ± 5%	5	ARD
C215, 229	**ECQM1H104JZ**	Polyester, 50V, 0.1μF, ± 5%	2	ARD
C228	**ECQM1H224JZ**	Polyester, 50V, 0.22μF, ± 5%	1	ARD
C205	ECQM05474KZ	Polyester, 50V, 0.47μF, ± 10%	1	
C208, 209	ECQM2332KZ	Polyester, 50V, 0.0033μF, ± 10%	2	
C211	**ECQS5100K**	Styrol, 50V, 10μF, ± 10%	1	
C213	**ECQS1101JZ**	Styrol, 125V, 100pF, ± 5%	1	ARD
C212	**ECQS1331JZ**	Styrol, 125V, 330pF, ± 5%	1	ARD
C217	**ECQS1391JZ**	Styrol, 125V, 390pF, ± 5%	1	ARD
C201	**ECEA50Z1**	Electrolytic, 50V, 1μF	1	
C230	**ECEA50Z2R2**	Electrolytic, 50V, 2.2μF	1	
C202, 218, 225	**ECEA1HS100**	Electrolytic, 50V, 10μF	3	
C227	**ECEA1ES101**	Electrolytic, 25V, 100μF	1	
C204	**ECEA1AS331**	Electrolytic, 10V, 330μF	1	
Variable Capacitor				
C210	ECV1ZW10X53	Ceramic Trimmer, 10pF	1	
Crystal				
X1	TSS616–1K	Oscillator, 3.5796MHz	1	
CONTROL CIRCUIT BOARD				
Transistors				
TR101, 113 ~ 130	**2SC1328–T**	Transistor	18	
TR102 ~ 108, 110, 131, 132,	**2SA722–S**	Transistor	10	
TR109	**2SA722–S**	Transistor	1	
TR111, 112, 120,	**2SC1328–T**	Transistor	3	
TR151 ~ 154	2SK30A–Y	Transistor	4	
Diodes				
D101, 102, 104, 105, 106, 108	**MA162A**	Diode	6	
D103	**RVDRD9R1FB**	Diode	1	RD
D107	SVDRD5.6ECS	Diode	1	
Resistors				
R121	**ERO25CKF8201**	Metallic, 1/4W, 8.2kΩ, ± 1%	1	
R119	**ERO25CKF1002**	Metallic, 1/4W, 10kΩ, ± 1%	1	
R174	**ERO25CKF1002**	Metallic, 1/4W, 10kΩ, ± 1%	1	
R175	**ERO25CKF2002**	Metallic, 1/4W, 20kΩ, ± 1%	1	
R149	**ERD12FJ820**	Carbon, 1/2W, 82Ω, ± 5%	1	
R145	**ERD12FJ221**	Carbon, 1/2W, 220Ω, ± 5%	1	
R156	**ERD12FJ331**	Carbon, 1/2W, 330Ω, ± 5%	1	
R147	**ERD12FJ471**	Carbon, 1/2W, 470Ω, ± 5%	1	
R192	**ERD25FJ222**	Carbon, 1/2W, 2.2kΩ, ± 5%	1	
R144	**ERD25FJ332**	Carbon, 1/4W, 3.3kΩ, ± 5%	1	
R122, 166	**ERD25FJ392**	Carbon, 1/4W, 3.9kΩ, ± 5%	2	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
R115	**ERD25FJ472**	Carbon, 1/4W, 4.7kΩ, ± 5%	1	
R124	**ERD25FJ512**	Carbon, 1/4W, 5.1kΩ, ± 5%	1	
R130	**ERD25FJ752**	Carbon, 1/4W, 7.5kΩ, ± 5%	1	
R190	**ERD25FJ471**	Carbon, 1/4W, 470Ω, ± 5%	1	
R102, 105, 135	**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ± 5%	3	
R131, 132	**ERD25FJ222**	Carbon, 1/4W, 2.2kΩ, ± 5%	2	
R151	**ERD25FJ332**	Carbon, 1/4W, 3.3kΩ, ± 5%	1	
R134, 177, 178, 184	**ERD25FJ472**	Carbon, 1/4W, 4.7kΩ, ± 5%	4	
R117, 118, 176	**ERD25FJ822**	Carbon, 1/4W, 8.2kΩ, ± 5%	3	
R139, 141, 162, 163, 185, 188 196, 198	**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ± 5%	8	
R103, 104, 107, 108, 114, 154, 155, 157, 158, 159, 173, 187, 195	**ERD25TJ123**	Carbon, 1/4W, 12kΩ, ± 5%	13	
R148, 169	**ERD25TJ153**	Carbon, 1/4W, 15kΩ, ± 5%	2	
R183, 194	**ERD25TJ183**	Carbon, 1/4W, 18kΩ, ± 5%	2	
R129, 146, 182, 189, 197	**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ± 5%	5	
R112, 152, 167, 193	**ERD25TJ273**	Carbon, 1/4W, 27kΩ, ± 5%	4	
R153, 168, 170, 179, 180	**ERD25TJ333**	Carbon, 1/4W, 33kΩ, ± 5%	5	
R111, 128, 133	**ERD25TJ393**	Carbon, 1/4W, 39kΩ, ± 5%	3	
R125, 140, 143 161	**ERD25TJ473**	Carbon, 1/4W, 47kΩ, ± 5%	4	
R126, 142	**ERD25TJ683**	Carbon, 1/4W, 68kΩ, ± 5%	2	
R109	**ERD25FJ432**	Carbon, 1/4W, 4.3kΩ, ± 5%	1	
R138	**ERD25TJ913**	Carbon, 1/4W, 91kΩ, ± 5%	1	
R116, 136, 137, 150, 160, 165, 171, 172	**ERD25TJ104**	Carbon, 1/4W, 100kΩ, ± 5%	8	
R113	**ERD25TJ124**	Carbon, 1/4W, 120kΩ, ± 5%	1	
R120, 186	**ERD25TJ154**	Carbon, 1/4W, 150kΩ, ± 5%	2	
R127, 164, 191	**ERD25TJ224**	Carbon, 1/4W, 220kΩ, ± 5%	3	
R101	**ERD25TJ394**	Carbon, 1/4W, 390kΩ, ± 5%	1	
R110	**ERD25TJ474**	Carbon, 1/4W, 470kΩ, ± 5%	1	
R181	**ERD25TJ105**	Carbon, 1/4W, 1MΩ, ± 5%	1	
Variable Resistors				
VR101	EVSP1AA00E24	Variable Resistors 20kΩ	1	
VR102	EVSP1AA00E23	Variable Resistors 2kΩ	1	
Capacitor				
C110	**ECQS1271JZ**	Styrol, 125V, 270pF, ± 5%	1	ARD
C111, 112	**ECQS1222JZ**	Styrol, 125V, 2200pF, ± 5%	2	ARD
C109	**ECQM1H562JZ**	Polyester, 50V, 0.0056μF, ± 5%	1	ARD
C104	**ECQM1H103JZ**	Polyester, 50V, 0.01μF, ± 5%	1	ARD
C114	**ECQM1H223JZ**	Polyester, 50V, 0.022μF, ± 5%	1	ARD
C102	**ECQM1H333JZ**	Polyester, 50V, 0.033μF, ± 5%	1	ARD
C101, 115	**ECQM1H473JZ**	Polyester, 50V, 0.047μF, ± 5%	2	ARD
C113	**ECQM1H823JZ**	Polyester, 50V, 0.082μF, ± 5%	1	ARD
C105, 107, 108	**ECQM1H104JZ**	Polyester, 50V, 0.1μF, ± 5%	3	ARD
C106	**ECEA50Z1**	Electrolytic, 50V, 1μF	1	
C103	**ECEB1JS100**	Electrolytic, 63V, 100μF	1	

Ref. No.		Part No.	Part Name & Description	Per Set		Remarks
CONNECTIONAL BOARD						
Resistors						
R301		**ERD25FJ151**	Carbon, 1/4W, 150Ω, ± 5%	1		
Capacitors						
C301		**ECEA1HS100**	Electrolytic, 50V, 10μF	1		
C302, 303		**ECQM1H104JZ**	Polyester, 50V, 0.1μF, ± 5%	2		ARD
CABINET AND CHASSIS PARTS						
1		SFTG102–01	Turntable Mat	1		
2		SFTE102–01E	Turntable	1		
2–1		SFXJ102–08E	Screw, Turntable	3		
3		SFUP102–06	Cover, Brake	1		
3–1		**XSS3+8BVS**	Screw, Cover	5		WDD
4		SFTG102–03	Rubber, Brake Cover	1		
5		SFUP102–09A	Brake, Band	1		
5–1		**XUC3FT**	Circlip, Brake Band	1		WDD
6		SFUP102–05E	Plate, Brake	1		
6–1		XYN3+C8FZS	Screw, Plate	1		
6–2		SFXW120–01	Washer, Plate	1		
7		SFUP102–07	Plate, Adjustment	1		
7–1		XYN3+C6FZS	Screw, Plate	2		
8		SFXJ102–02	Screw, Adjustment	1		
8–2		SFPEW12002	Washer	1		
8–3		**XUC4FT**	Circlip	1		WDD
9		SFUM102–01	Brake Hausing	1		
9–1		XYN4+C15FZS	Screw	3		
10		SFUP102–15	Plate, Brake Adjustment	1		
10–1		**XTV3+8BFZ**	Screw, Adjustment Plate	1		WDD
10–2		SFXW120–01	Washer, Adjustment Plate	1		
11		SFMZ102–01E	Motor Ass'y	1		
12		SFDZSD1AC10	Plunger	1		
12–1		SFEB3UT	Tube	1		
13		SVDIS1887	Diode	1		
14		SFXJ102–03	Lever, Plunger	1		
14–1		SFXO102–01	Spacer, Plunger	1		
14–2		SFQA102–01	Spring, Brake	1		
14–3		SFGH102–01	Rubber, Plunger	1		
14–4		SFGH102–02	Rubber, Washer	1		
14–5		**XWA3B**	Washer	1		WDD
14–6		**XNG3ES**	Nut	1		WDD
15		SFUP102–12	Mounting Plate, Plunger	1		
15–1		XYN3+C5FZS	Screw, Mounting Plate	3		
15–2		SFXW120–01	Washer, Mounting Plate	3		
16		SFAC102–01	Panel Case	1		
16–1		SFNN102M01	Name Plate	1		
16–2		SFKB102–01	Badge	1		
17		SFUM102–02	Neon Lamp Base, A	1		
19		SFUP102–02	Neon Lamp Base, C	1		
19–1		XYN3+C6FZS	Screw, Neon Lamp Base	2		
20	⚠	SFDNNL78WM	Neon Lamp	1		
20–1		SFEB3UT	Tube	1		
21		SFUP102–08	Holder, Neon Lamp	1		
22		SFUP102–17	Holder, P.C.B.	1		
22–1		SFEZ196	Spacer, P.C B	1		

Ref. No.		Part No.	Part Name & Description	Per Set		Remarks
22–2		XYN3+C8FZS	Screw	2		
22–3		**XWA3B**	Washer	2		WDD
23		SFXJ102–05	Spacer, P.C.B.	11		
24		SFXJ102–04	Spacer, Bottom Case	3		
25		SFDJ12804S	Connector, 4P	1		
27		SFDJ12810S	Connector, 10P	1		
28		SFDJ12804S	Connector, 4P	1		
28–1		SFEB2UT	Tube	1		
29		SFDJXI53250	Connector	1		
30		SFDJXI53241	Connector	2		
30–1		SFDJ12812P	Connector, 12P	1		
30–2		SFDJ12910P	Connector, 10P	1		
30–3		SFDJ12906P	Connector, 6P	1		
30–4		SFDJ12904P	Connector, 4P	1		
31–1		SFUP102–11	Plate, Heat Sink	1		
31–2		XYN3+C6FZS	Screw	4		
31–3		**XSN3+6S**	Screw	2		WDD
32–1		XYN3+C6FZS	Screw	9		
32–2		**XWA3B**	Screw	13		WDD
34		RJJ10C	Jack	1		
35		SFER1E	Mounting, Ground Wire	1		
35–2		SFEB3UT	Tube	1		
35–3		**XWC3B**	Washer	1		WDD
35–4		XYN3+C6FZS	Screw	1		
36		SJT719	Mounting Plate	1		
36–1		**XNG4ES**	Nut	1		WDD
36–2		**XWA4B**	Washer	1		WDD
36–3		SFEB3UT	Tube	1		
37		SFUZ102–05	Mounting Plate, Socket	1		
37–1		**XNG3ES**	Nut	2		WDD
38		SFUP102–03	Mounting Plate, Cord	1		
38–1		XWC3B	Washer	4		WDD
38–2		XYN3+C8FZS	Screw	2		
38–3		XYN3+C6FZS	Screw	2		
39		SGE103	Terminal	1		
40		SNE281–1S	Terminal Screw	1		
41		SNE273–1	Knob	1		
43		SFSR5N4	Bushing, Cord	1		
44		SFDJ102–01E	Plug	1		
45		SFAU102–01	Bottom Case	1		
45–1		**XSS3+8BVS**	Screw	12		WDD
45–2		XYN3+C8FZS	Screw	2		
45–3		SFXW120–01	Washer	2		
45–4		SFGK102–01	Rubber Cap	1		
45–5		SFUZ102–03	Felt	4		
46		SFNZ102–02	Lable Remort	1		
47		SFKT102–01	Plate, Start Stop Switch	1		
47–1		SFKK102–01	Ornament, Start Stop Switch	1		
47–2		SFQA102–03	Spring, Start Stop Switch	1		
47–3		SFXJ102–06	Adjustment Screw, Start Stop Switch	1		
47–4		**XWA2B**	Washer	2		WDD
47–5		**XSN2+6**	Screw	11		WDD
47–6		**XWE2BW**	Washer	11		WDD
48		SFKT102–02E	Plate, Select 33	1		
49		SFKT102–03E	Plate, Select 45	1		
50		SFKT102–04E	Plate, Select 78	1		
51		SFQA102–02	Spring, Select	3		
52		SFUM102–05	Mounting Plate, Switch	1		
52–1		**XWA2B**	Washer	3		WDD
52–2		**XNG2EBW**	Nut	6		WDD

Ref. No.		Part No.	Part Name & Description	Per Set	Remarks
53		SFUM102–06	Switch Cover	1	
53–1		**XNG2EBW**	Nut	3	WDD
53–2		**XWA2B**	Washer	2	WDD
53–3		**XSN2+6**	Screw	2	WDD
54		SFDSSSL1–C	Micro Switch	3	
55		SFUM102–07	Switch Cover	1	
55–1		**XSN2+6**	Screw	2	WDD
55–2		**XWA2B**	Washer	5	WDD
55–3		**XSN2+10**	Screw	3	WDD
56		SFUP102–04	Mounting Plate, Select Switch	1	
56–1		XYN3+C10F	Screw	2	
56–2		XYN3+C6FZS	Screw	2	
57		SFXO102–02	Micro Switch	1	
58		SFDSSSL1–C	Micro Switch	1	
59		LN22L	Light Emitting, Diode	3	
60		SFUM102–04	Holder, Diode	3	
61		SFDP102–05	Plate Ass'y	1	
62		SFUP102–18	Plate	3	
POWER UNIT (Model SH-10E)					
Transistors					
TR401, 402, 407, 408, 409, 410		**2SC1328–T**	Transistor	6	
TR403		**2SA722–S**	Transistor	1	
TR404		**2SD389A–Q**	Transistor	1	MTD
TR405		**2SD389A–Q**	Transistor	1	MTD
TR406		**2SD334**	Transistor	1	
Diodes					
D401, 403, 404	⚠	**RVD10DC4**	Diode	3	RD
D402, 405, 406	⚠	**RVD10DC4R**	Diode	3	RD
D407	⚠	SVDRD5.6ECS	Diode	1	
D408		**SVDRD16EB**	Diode	1	
D409		**MA162A**	Diode	1	
D410		**20A90**	Diode	1	ARD
D411		SVD1S1887	Diode	1	
D412		SVDSV05	Diode	1	
Variable Resistors					
R405		**EVTS0AA00B52**	Variable Resistor, 500Ω (B)	1	ARD
R445		**EVTS0AA00B23**	Variable Resistor, 2kΩ (B)	1	ARD
Fuses					
F1	⚠	XBA2C10TR0	Fuse, T1A, 250V	1	
F2	⚠	XBA2C25TR0	Fuse, T2.5A 250V	1	
F3	⚠	XBA2C03TR0	Fuse, T315mA, 250V	1	
F4	⚠	XBA2C012SS0	Fuse, 125mA, 250V	1	
F5	⚠	XBA2C16TR0	Fuse T1.6A, 250V	1	

Ref. No.		Part No.	Part Name & Description	Per Set	Remarks
Resistors					
R401	⚠	**ERD50FJ4R7**	Carbon, 1/2W, 4.7Ω, ± 5%	1	
R402, 403		**ERD25FJ471**	Carbon, 1/4W, 470Ω, ± 5%	2	
R404		**ERD25FJ561**	Carbon, 1/4W, 560Ω, ± 5%	1	
R406		**ERD25FJ392**	Carbon, 1/4W, 3.9kΩ, ± 5%	1	
R407, 408		**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ± 5%	2	
R409		**ERD25FJ681**	Carbon, 1/4W, 680Ω, ± 5%	1	
R410		**ERD12FJ102**	Carbon, 1/2W, 1kΩ, ± 5%	1	
R411		**ERD25FJ512**	Carbon, 1/4W, 5.1kΩ, ± 5%	1	
R412		**ERD25FJ432**	Carbon, 1/4W, 4.3kΩ, ± 5%	1	
R413		**ERD50FJ202**	Carbon, 1/2W, 2kΩ, ± 5%	1	
R414		**ERD25FJ392**	Carbon, 1/4W, 3.9kΩ, ± 5%	1	
R416		**ERD25FJ682**	Carbon, 1/4W, 6.8kΩ, ± 5%	1	
R417, 422		**ERD25FJ561**	Carbon, 1/4W, 560Ω, ± 5%	2	
R418		**ERD25TJ513**	Carbon, 1/4W, 51kΩ, ± 5%	1	
R419		**ERD25FJ912**	Carbon, 1/4W, 9.1kΩ, ± 5%	1	
R420		**ERD25FJ112**	Carbon, 1/4W, 1.1kΩ, ± 5%	1	
R421		**ERD25TJ104**	Carbon, 1/4W, 100kΩ, ± 5%	1	
Capacitors					
C401, 402	⚠	ECKDDS472ME	Polyester, 125VAC, 0.0047μF, ± 20%	2	
C404, 405, 406, 407	⚠	RXAF103P22HD	Ceramic, 500V, 0.01μF x 2,	4	
C408		ECQM6103MZ	Polyester, 600V, 0.01μF, ± 20%	1	
C409		**ECQM1H822JZ**	Polyester, 50V, 0.0082μF, ± 5%	1	ARD
C410		**ECEB1CS102**	Electrolytic, 16V, 1000μF,	1	
C411, 412		**ECEA1ES101**	Electrolytic, 25V, 100μF	2	
C413	⚠	ECEM80R1000X	Electrolytic, 80V, 1000μF	1	
C414, 415		**ECEA1JS101**	Electrolytic, 63V, 100μF	2	
C416		ECEB160V100	Electrolytic, 160V, 100μF	1	
C417		**ECEA160V22**	Electrolytic, 160V, 22μF	1	
CABINET and CHASSIS PARTS					
1–1		SFKK10E–01A	Panel Ass'y Front	1	
1–2		SGLA9	Lamp, Indicate	1	
1–3		SFUZ10E01	Felt	1	
2		SFUP10E–02E	Case	1	
2–1		SFNN10EX01	Name Plate	1	
2–2		**XSN3+6BVS**	Screw	10	WDD
3		SBLA4–3	Knob, Power Switch	1	
4		XVE3A8FZS	Screw	4	
5	⚠	SFDS10EX01	Power Switch	1	
5–1		SFUP10E–03	Mounting Plate, Power Switch	1	
5–2		SFUP10E–09	Mounting Plate, Panel	1	
5–3		SFUP10E–04	Holder, Lamp	1	
5–4		XYN3+C6FZS	Screw	2	
6		**XAM37T500**	Lamp	1	ARD
6–1		SMZA6091	Rubber, Lamp	1	
7	⚠	ETP85Q3E	Power, Transformer	1	
7–1		**XNG4ES**	Nut	4	WDD
7–2		**XWA4B**	Washer	4	WDD
7–3		**XWG4**	Washer	4	WDD
7–4		**XSN4+8BVS**	Screw	4	WDD
8		SFDJD4F	Socket, DC .	1	
8–1		SJS5505	Connector, 5P	1	
8–2		**XSS3+10BNS**	Screw	2	WDD
9		SFUP10EX01	Mounting Plate, AC Cord	1	

Ref. No.		Part No.	Part Name & Description	Per Set		Remarks
9–1		**XSN3+6BVS**	Screw	2		WDD
9–2		**XSN3+12BVS**	Screw	2		WDD
9–3		**XWA3B**	Washer	2		WDD
9–4		**XNG3ES**	Nut	2		WDD
10	⚠	**SJA88**	AC Cord	1		TSD
11		SFSR4N–4	Bushing, Cord	1		
12–1		XTW3+10HFZ	Screw	2		
12–2		SJS5405	Connector, 4P	1		
12–3		SFDZ023X01	Holder, Fuse	10		
12–4		SFER1C	Terminal	1		
12–5		**XNG3ES**	Nut	1		WDD
12–6		**XSN3+6BVS**	Screw	1		WDD
13–1		XTW3+10HFZ	Screw	2		
13–2		SHE36	Clamper, Wire	1		
13–3		**XSN3+6BVS**	Screw	2		WDD
13–4		SFXO10E–01	Spacer	1		
13–5		SJS5307	Connector, 3P	1		
13–6		SFDJS3PSHF	Connector, 3P	1		
14		SFUP10E–08	Mounting Plate	1		
14–1		SFEZ196	Sporting, P.C.B.	2		
15		SFUP10E–01	Case, Bottom	1		
15–1		XTW3+10HFZ	Screw	4		
15–2		**XSN3+6BVS**	Screw	2		WDD
15–3		**XNG3ES**	Nut, Capacitor	2		WDD
16	⚠	SFDSHXW0103	Selector, Switch	1		
16–1		SFUM130G01	Base, Selector Switch	1		
REMOTE CONTROL (Model SH-10R)						
1		SFKK102–01	Ornament Plate, Start Stop	1		
1–1		SFXJ102–06	Screw	1		
2		SFUM10R01E	Case	1		
3		SFDSSSL1–C	Micro Switch	1		
3–1		XTN2+10B	Screw	1		
4		SFUP10R02	Mounting Plate, Micro Switch	1		
4–1		**XTN2+6B**	Screw	2		WDD
5		**ERD25FJ101**	Carbon, 1/8W, 100Ω, ± 5%	1		
5–1		SFEB3UT	Tube	1		
5–2		SFEB2UT	Tube	1		
6		SFGP10R–01	Rubber, Bushing	1		
7		SFEZ10R–01	Cord, Jack	1		
8		SFUP10R–01	Bottom Cover	1		
8–1		**XTS3+8BFZ**	Screw	4		WDD
9		SFNN10RM01	Name Plate	1		
ACCESSORY PARTS						
A1		SFNU102X01	Operating Instructions	1		
A2		SQXA2004	Product Service Guide	1		
A5		SFWE010	45 Adaptor	1		
A6		SFWO010	Oil	1		
A8		**XSN5+35S**	Screw A	5		WDD
A9		**XSN5+45S**	Screw B	5		WDD
A10		SFXW650–2	Washer	5		

Ref. No.		Part No.	Part Name & Description	Per Set		Remarks
PACKING PARTS						
P2 [EG]		SFHP102X01	Carton Box	1		
P2 [XGF]		SFHP102C01	Carton Box	1		
P3		SFHH102–06	Bottom Pad	1		
P4		SFYF60A60	Polyethylene Bag	1		
P5		SFYF10A30	Polyethylene Bag	3		
P6		SFHH102–04	Side Pad (L)	1		
P7		SFHH102–05	Side Pad (R)	1		
P8		SFYF15A20	Polyethylene Bag	1		
P9		SFHH102–07	Side Pad, Power Unit	1		
P10		SFHH102–08	Side Pad, Power Unit	1		
P11		SFHD102–06	Case, Power Unit	1		
P12		SFYF45A50	Polyethylene Bag	2		
P13		SFHD102–05	Top Pad, Turntable	1		
P14		SFYF27A40	Polyethylene Bag	1		
P15		XYN3+C6BS	Screw, Clamper	7		
P16		SFUP102M14E	Mounting Plate, Motor	1		

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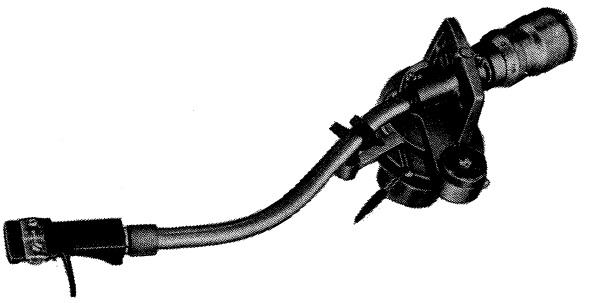
ORDER NO. SD7702-1187

Service Manual

Universal Tonearm

EPA-100 (X)

Note:
The model EPA-100(X) is available in European, Scandinavia, Asia, Lation Ameria, Oceania, Middle East and Africa.



Specifications

(Specifications are subject to change without notice for further improvement)

Type	Universal Tonearm with Variable Dynamic Damping system
Bearings	Gimbal-suspension system with shock-resistant pivot and coil spring, and highly precise ruby ball bearings (20)
Tubular tonearm	High-strength titanium tubular tonearm with special nitrification finish
Effective length	250 mm
Overall range	322—350 mm
Arm rear range	66—94 mm
Height adjustment range	42—90 mm (helicoid part: 6 mm)
Overhang	15 mm
Horizontal tracking error angle	+1.1° (internal perimeter of 30 cm record) +2.1° (external perimeter of 30 cm record)
Friction	5 mg (horizontally and vertically)
Effective mass	22 g (at 6.5 g cartridge weight, 1.25 g stylus pressure)
Resonance frequency	9.8 Hz (at 6.5 g cartridge weight, 1.25 g stylus pressure, 12×10^{-6} cm/dyne compliance)
Resonance acute angle (Q)	6 dB or less (at optimum adjustment)

Damping adjustment range

Damping selector calibrations	Cartridge compliance (100 Hz dynamic)
4~5	more than 15×10^{-6} cm/dyne
2~4	$10 \sim 15 \times 10^{-6}$ cm/dyne
1~2	$5 \sim 10 \times 10^{-6}$ cm/dyne

Stylus pressure adjustment range	0—3 g
Head shell weight	9.5 g
Cartridge mounting dimensions	12.7 mm (1/2 inch) mounting space
Head shell terminal lug	1.2ø, for 4-pin terminal
Cartridge weight range	5—10 g
Arm installation opening	38 mmø

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

■ Parts identifications

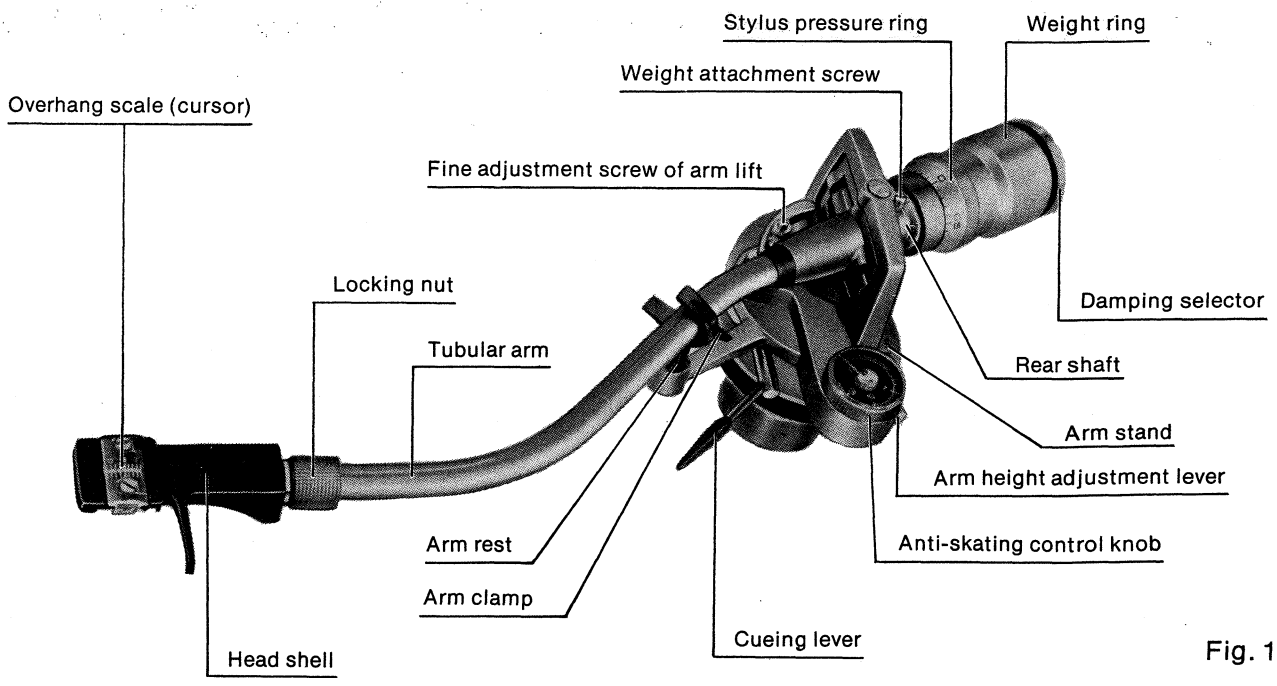


Fig. 1

■ Assembly and set-up

Installation of the balance weight
Place the balance weight onto the rear shaft of the tonearm, align the hole for the screw, and tighten the screw completely (Fig. 2).

Adjustment of the damping selector
This tonearm includes a unique magnetic damping selector which can be used to assure that the tonearm is perfectly matched to the compliance of the cartridge to be used.
The damping selector is calibrated in five positions, (1—5), and the position which corresponds to the compliance and weight of the cartridge should be aligned with the index mark on the balance weight. (Refer to the chart of Fig. 3 and see Fig. 4.)
The following are the standards of applicable calibrations depending upon the compliance of the cartridge to be used.
For precision, also refer to feature (1).

Damping selector calibrations	Cartridge compliance (100 Hz dynamic)
4~5	more than 15×10^{-6} cm/dyne
2~4	$10 \sim 15 \times 10^{-6}$ cm/dyne
1~2	$5 \sim 10 \times 10^{-6}$ cm/dyne

Fig. 3

Note that the damping selector position is continuously variable, and any position between the calibrations can therefore also be selected.
Note:
If the damping selector is rotated completely in the direction of the [1] mark, the movable weight inside the balance weight will become locked, and the tonearm can be used as an ordinary high-sensitivity tonearm, without dynamic damping.
When the unit is moved, be sure to rotate the damping selector completely to the [1] mark in order to lock and protect the internal structure of the balance weight.

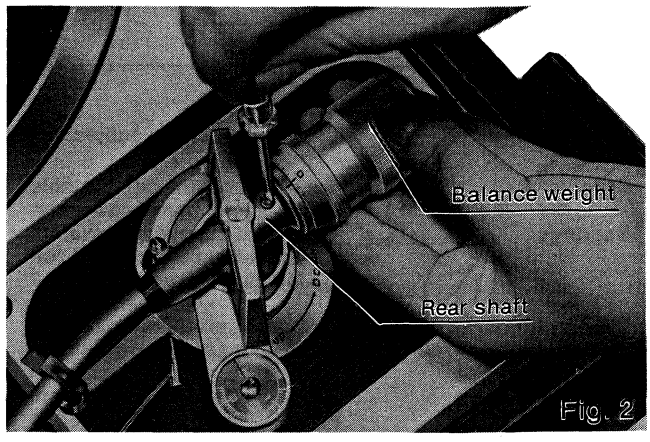


Fig. 2

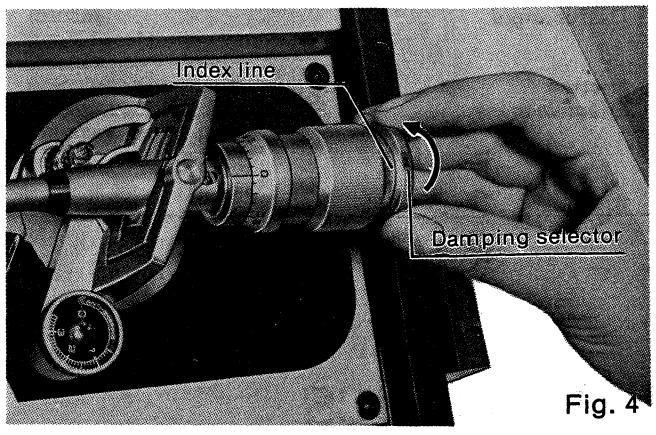


Fig. 4

■ Adjustment of parts

1. Adjustment of the "0" balance

Before making the adjustment of horizontal balance, check the following points:

1. Check whether the cueing lever is in the down position or not.
2. Check whether the anti-skating control is set to the "0" position or not.
   Although the tonearm may move very slightly to the left and right when the anti-skating control is set to the "0" position, this is because of the high sensitivity of the rotating part of the tonearm, and is no problem, because the la ral force is very small.
3. If the cartridge to be used has a removalbe cover, remove it.

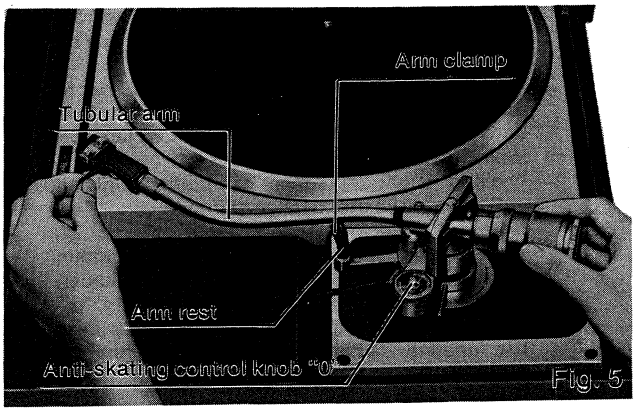


Fig. 5

2) Adjustment of horizontal (zero) balance and of stylus pressure

1. Remove the arm clamp, and move the tonearm away from the arm rest so that it is freely suspended (Fig. 5).
2. While turning the weight ring in direction "A" or "B" (as indicated by the arrows), adjust so that the tonearm is as horizontal as possible (Fig. 6).
   Do not touch the damping selector while making this adjustment.
3. After finishing the adjustment of the horizontal balance, return the tonearm to the arm rest, and secure it with the arm clamp.

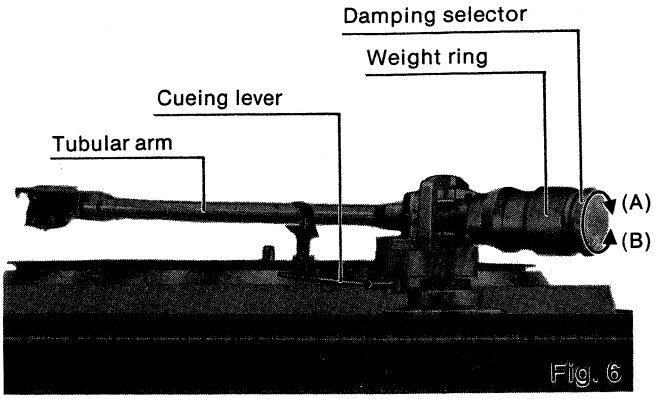


Fig. 6

4. As shown in the figure, hold the weight ring with a finger so that it does not move, and turh only the stylus pressure ring so that the "0" indication of the ring is aligned with the index mark on the weight (Fig. 7).
   Note:
   When the horizontal balance is adjusted, be careful that the stylus tip of the cartridge does not touch the turntable mat or the turntable base.
5. Next turn the weight ring, and set it to the numerical value corresponding to the rated stylus pressure of the cartridge to be used (Fig. 8).
   Because the stylus pressure ring also moves when the weight ring is turned, the calibration can be read directly, thus making it easy to correctly adjust the stylus pressure.
6. Turn the anti-skating control, and set it to the same numerical value as the stylus pressure (Fig. 9).

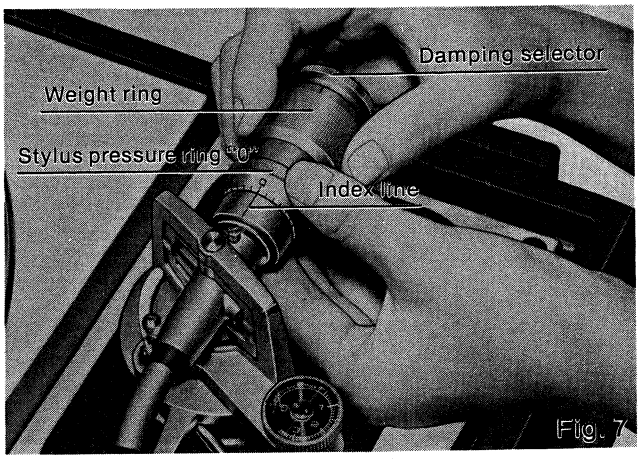


Fig. 7

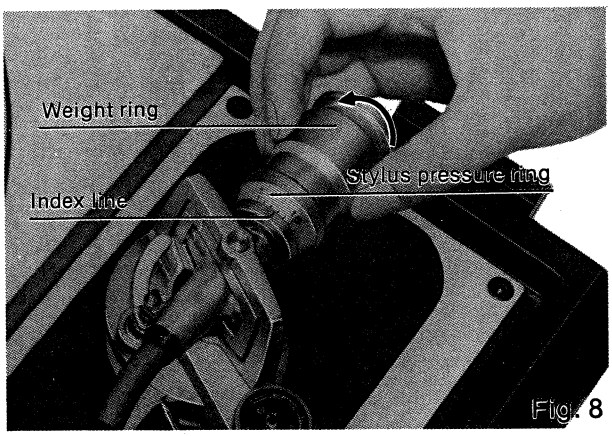


Fig. 8

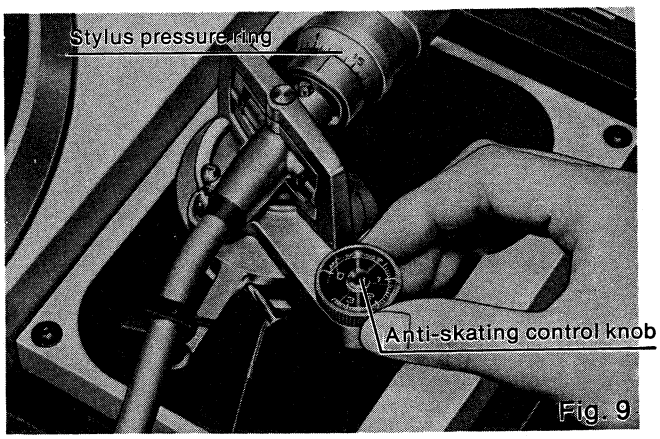


Fig. 9

3) Adjustment of arm height and confirmation of arm movement range

1. Place a record on the turntable, and, without rotating the turntable, gently place the stylus tip on the record.
2. While turning the arm height adjustment lever to the "DOWN" position, adjust the tubular arm until it is nearly parallel with the record surface. (See Fig. 10).
   The arm height adjustment can be fine adjusted in 0.5mm steps over a range of 6mm.
   Note:
   If the fine adjustment of the correct height within the range can not be made, turn the fine adjustment height lever in the "UP" direction to "6," loosen the securing screws, and slightly raise the tonearm. Afterward, re-adjust the fine adjustment.

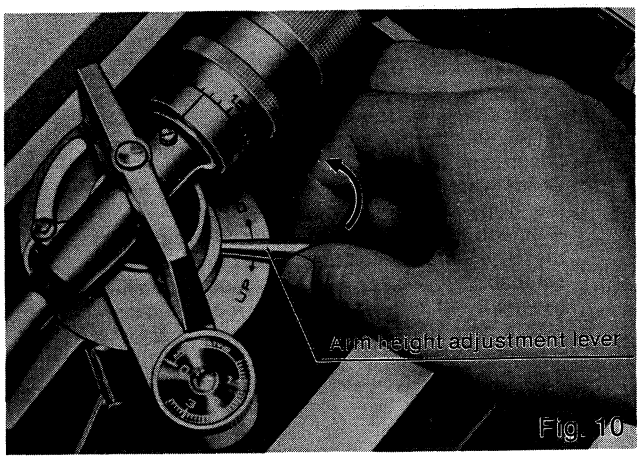


Fig. 10

4) Adjustment of arm lift distance

The arm lift distance (the space between the stylus tip and the record surface when the cueing lever is raised as shown in the figure) is most suitable at about 5~10mm. Adjust, if necessary, so that the distance will be within this range (Fig. 11).

1. Raise the cueing lever.
2. To make the adjustment, first loosen the lock nut and then turn the screw for fine adjustment of the arm lift (Fig. 12).
   After adjustment, re-tighten the lock nut.
   Clockwise
   The distance between the stylus tip and the record surface will increase.
   Counterclockwise
   The distance between the stylus tip and the record surface will decrease.

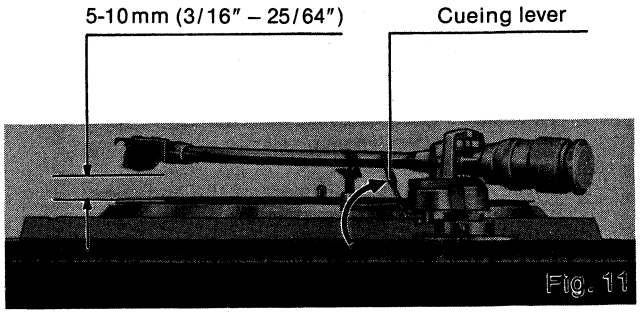


Fig. 11

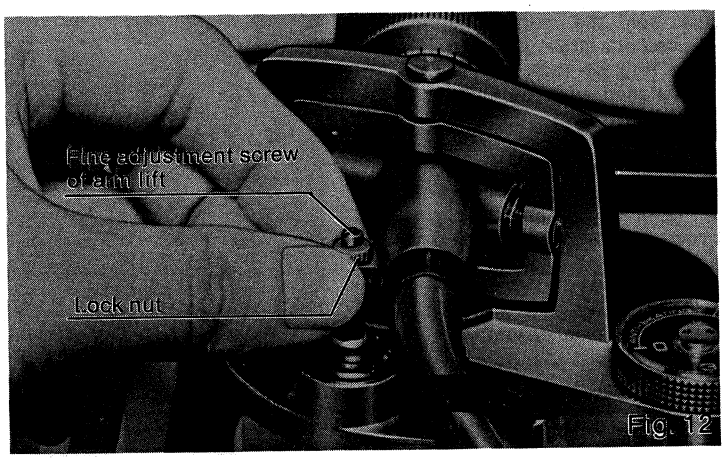
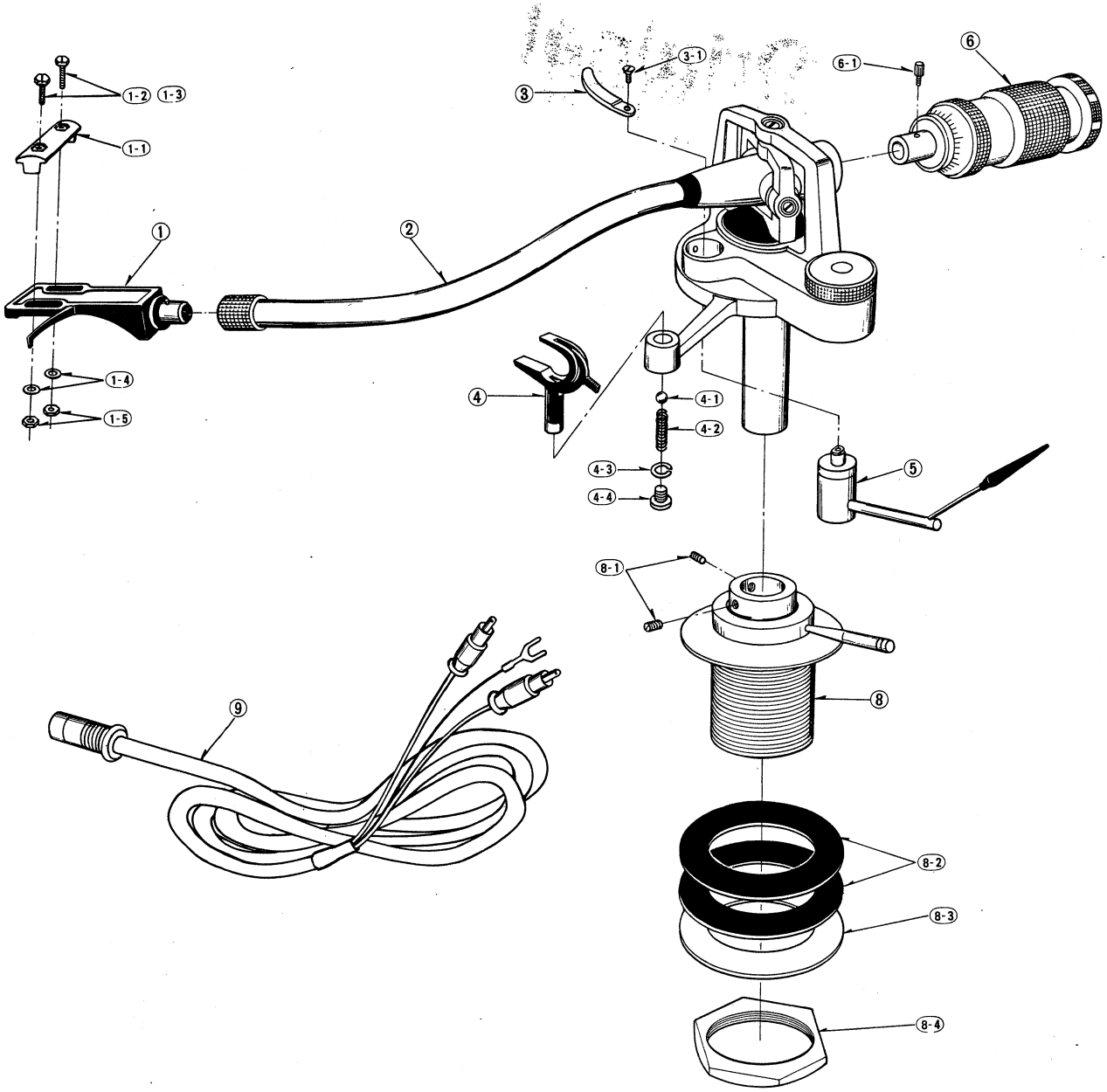


Fig. 12

■ REPLACEMENT PARTS LIST

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
		MECHANICAL PARTS			
1	SFPCC10001K	Head Shell	1		○
1-1	SFPKS10001	Cursor	1		○
1-2	SFPEV10005	Screw	2		○
1-3	SFPEV7805	Screw	2		
1-4	SFPEW9601	Washer	4		
1-5	SFPEN9200	Nut	4		
2	SFPAM10001K	Tone Arm	1		○
3	SFPRT10001	Arm Lift	1		
3-1	XSS17-4BN	Screw	1		○
4	SFPRT10003K	Arm Rest	1		○
4-1	SFYBM30	Steel Ball	1		※○
4-2	SFPSP10006	Spring, Arm Rest	1		○
4-3	XWA4BFM	Washer	1		○
4-4	SFPRT10004	Screw	1		○
5	SFPRT10001K	Lift Ass'y	1		○
6	SFPWG10001K	Balance Weight Ass'y	1		○
6-1	SFPEV10001	Screw	1		○
8	SFPKD10003K	Arm Stand	1		○
8-1	SFPEV10008K	Screw	2		○
8-2	SFPGM10002	Rubber, Arm Stand	2		○
8-3	SFPEW1001	Washer	1		○
8-4	SFPEN10003	Nut	1		○
9	SFPZB10106	Phono Cord	1		
		ACCESSORY PARTS			
A1	SFPZB10005	Template	1		○
A2	SFPZB10004	Wrench	1		○
A3	SFPZB10006	Screwdriver	1		○
A4	SFPZB4500	Spacer	1		○
A5	SFPZB3501	Spacer	1		○
A6	SFPDS10002	Instruction Book	1		○
		PACKING MATERIALS			
P1	SFPHH10002	Packing Case	1		○
P2	SFHH101-07	Pad, Top	1		○
P3	SFHH101-06	Pad, Bottom	1		○
P4	SFYF15A20	Polyethylene Cover	1		
P5	SFYF10A30	Polyethylene Cover	1		
P6	SFYF09B15	Polyethylene Cover	1		

■ EXPLODED VIEW OF UNIVERSAL TONEARM



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